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He has achieved success who has lived well, laughed often, and loved much; who has gained the respect of intelligent men and the love of little children; who has filled his niche and accomplished his task, who has left the world better than he found it; whether by an improved poppy, a perfect poem, or a rescued soul; who has never lacked appreciation of earth's beauty or failed to express it; who has always looked for the best in others and given the best he had; whose life was an inspiration, whose memory was a benediction.

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METHODS WITH ADOLESCENTS

BY

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ILLINOIS STATE NORMAL UNIVERSITY

With a Foreword by
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FOREWORD

The road from theory to accepted practice is frequently long and arduous. Modifications of practice as a result of changes in theory are frequently so slight as to be almost imperceptible except over long stretches of time. And in no field is this truer than in a field characterized by all of the complex elements of human nature. It apparently is easier to improve the quality of steel rails, to propagate a new variety of corn, or to change the constituent elements of limestone soil, than it is to modify human nature.

Science, however, is not concerned with things of the material world alone. Long ago it began the study of mind itself. It imposed upon the realms of thought and action, the methods of introspection, of critical observation, and of philosophical implication. Conclusions, novel and bizarre in character, fill the literature of the periods when these various methods were in vogue.

Science as it improved its technique and refined its procedure discovered, among other things, that the laws of mental life are not fixed and immutable. On the contrary, it discovered that they are subject to wide deviation because of a variety of factors that play upon them.

One of the great leaders of the movement to study the content and nature of the human mind was G. Stanley Hall, the president of Clarke University. While his methods may not have been so meticulous and exact as the scientists of the present generation

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might desire, they were nevertheless the methods of a pioneering and adventurous spirit. He said in effect, "Let us study the person to be educated. Let us discover the characteristics of human beings, their needs, their wants, at different levels of maturity, and then build our educational system on the basis of these characteristics, needs and wants." Long before his monumental work on adolescence appeared, articles by himself, his students and associates, pointed the way to a new view of education.

The enthusiasm of Dr. Hall and others was not readily transmitted to the schoolmasters of the country. They listened with attention and sat at his feet, realizing that they were in the presence of one of the world's master teachers, but they did not know how to apply these new views, these psychological generalizations to the practical work of the schoolroom. Indeed, the course has not yet been run, but great has been the progress.

Apparently progress in education never moves forward in a straight line. It moves forward under the influence of dynamic personalities or the stress of effective movements. Things emphasized to-day may drop into the background to-morrow, but new things will be advanced to take their places. The emphasis of yesterday may not be the emphasis of to-day. But the values of these varying emphases apparently are never lost. Periods of little stress may really be periods of incubation. Periods of apparent quiescence may actually be periods of ripening for the harvest.

Much of this sort of thing has been taking place in secondary education. The influence of Hall and his group gave way before that of another group which laid emphasis upon a different technique and called attention to a different set of circumstances. The

study of mind became a matter of measurement rather than a matter of observation primarily. The methods of measurement did not bear fruit at once. There was much skepticism when they were first advanced. That they represented a refinement of the methods of Hall was not at first clearly seen and their ultimate significance has not yet been clearly understood.

There was another movement equally significant that influenced policies and determined programs in the field of secondary education. It was what was known as the sociological movement in contradistinction to the psychological movement. It was another case of lifting into relief a force long known to be present and to be effective in determining educational policies. The claim was made that the materials of instruction are determined by social conditions, forces, and conventions, while the methods of instruction are determined by the characteristics of the human mind. This meant that the teacher must look two ways—to society to find out what to teach and to the mind of the child to find out how to teach it. It is obvious that this movement has been more responsible than any other for a revival of interest in the curriculum. For a decade or more we have had curriculum studies without end. There has been much progress and great improvement in the reorganization of the materials by instruction. Only a beginning, however, has been made, or perhaps it would be more nearly correct to say that this is a problem to which there is no end so long as society is changing.

Critical observation, psychology, measurement, sociology, each in turn and in its own way, has influenced the conception of adolescent education, and yet there has never been a time when any one of them has been

absent. It has remained for the practical administrator or teacher on the job to keep these forces playing in proper relation to each other. Since he is not a philosopher, it has not been easy for him to integrate these contending forces. Indeed, he has not always succeeded in doing it, but the task has been his more largely than that of many a theorist. He learned that the materials of the curriculum, their selection and organization, cannot be disassociated from their psychological implications; that the methods of instruction are social in origin and social in meaning; and that both materials and methods lend themselves to measurement. Perhaps the practical schoolmaster was not solely responsible for this discovery, but he certainly played a conspicuous part in it.

This book is the fruition of this series of movements and the result of years of fruitful schoolroom experience by the author. It lays heavy tribute upon the lessons of psychology in presenting both the character and methods of instruction involved in educating the adolescent child. Questions of importance are disposed of not on the basis of the consensus of opinion but rather on the basis of the mental characteristics of the adolescent. The book is none the less pragmatic for that reason.

The problems of secondary instruction are stated with a clearness born of experience and solved with an assurance born of conviction. The treatment of these problems as related to the various branches of study is refreshing, in that integrity of the intellectual composition of the individual is never lost sight of. The materials of instruction as well as the methods involved in presenting them are seen at all times as contributing to this end. While the book is a book of method, it rises to a far higher level than devices, aids, helps,

hortatory advice, and rules of thumb. Method is not the end; it is merely an instrument or means of accomplishing through certain materials the social education of the adolescent child. The book, therefore, should be of helpful service to high-school teachers and administrators in training and to those in service in supplying them with fresh points of view relative to the practices of the secondary school. It professionalizes the materials and socializes the technique of instruction.

L. D. COFFMAN.

PREFACE

Four years ago the author published *Adolescence and High-School Problems*. The reception accorded that book by colleges, universities, normal schools, and reading circles encouraged him to write this volume. In the former book an attempt was made to solve problems pertaining to social administration and the high-school curriculum on the basis of adolescent psychology. In this book the author undertakes to deal with teaching problems in the same manner. It is assumed that, for the high-school teacher, there are two sources of inspiration: (1) a sympathetic and intelligent insight into the workings of the mind of his individual pupils and (2) a broad and growing knowledge of his subject matter. It is also assumed that the nature and needs of the pupils should largely condition both the content and the method of presenting high-school subjects and that in turn success is conditioned by these. Chapter II is a brief statement of the adolescent characteristics that furnish the foundation for the chapters that follow. This chapter is based on both study and observation, the author's experience in dealing with high-school pupils and in supervising the work of student-teachers having naturally influenced the discussions.

This book was written for the purpose of helping high-school teachers and prospective teachers, especially those in the smaller schools who are called upon to teach many subjects, and high-school principals who wish to aid their teachers in the solution of classroom

problems. It is a book of special methods. It is not a book of devices. Many teaching problems must be solved and much classroom procedure determined while class discussion moves rapidly toward its purpose. It would seem that the exigencies of the classroom can be met most successfully by the teacher who has considered carefully the relation of adolescent traits, not to high-school teaching in general, but to the teaching of the particular subjects. Because of its extreme difference in content and its varying appeals, each subject has a psychology and a pedagogy of its own which is here set forth in the successive chapters.

It is hoped that the reader will proceed through the entire book as it is written; the lack of common interest on the part of special teachers endangers the unity of educational aims. It is only by knowing the function of other subjects and being interested in their content and method that the teacher can understand, not what his subject contains, but what part it contributes toward the entire educational activity and welfare of each individual pupil. "Correlation" and "coöperation" are words to conjure with when considering the varying intellectual and social needs of the high-school pupils who daily pass from one teacher to another. However, each chapter is based directly on Chapter II and is intended to be complete within itself. Chapter III, as the title suggests, deals with principles and considerations that apply to all high-school teaching. Chapters IV, VII, and XIV are somewhat general and should be read in each case in connection with the two chapters that follow.

Ever since the days of Herbert Spencer, it has been repeatedly urged that "to prepare us for complete living is the function which education has to discharge"; that is, complete living is the *end* of all educational effort. Such is not the assumption of this book. The

treatment of each subject proceeds on the hypothesis that education *is* complete and vigorous living—not a new doctrine—and that both content and method must be made to conform to the interests and wants of the pupils as they go about their daily tasks. We are to meet present vital needs, not future contingent needs concerning which we may prophesy. It is here taken for granted that the full unfolding and maturing of all the pupil's powers by duly exercising these powers is the best possible preparation for the uncharted voyage that lies before him; abundant, well-rounded living to-day prepares for successful living to-morrow. However, the proponents of the "practical" education who propose to survey the needs of the economic, industrial, and social worlds and thus to determine content and method, are fruitfully contributing to educational theory and practice. The natural curiosity and intellectual hunger of adolescent boys and girls can usually be satisfied by using subject matter and methods found in fields of practical endeavor; for the psychology of adolescence teaches that pupils of high-school age, because of their broadening social outlook, are interested in processes and materials that best serve human needs. Interested, enthusiastic application of all the powers, however secured, is complete living and makes for self-realization.

The aim of every chapter is practical. Skillful, sympathetic teaching brings abundant returns; it encourages the weaker pupils, stimulates thought and imagination, and makes clearer to a larger percentage of the class misunderstood features of the subject. Because of the infinite gradation of ability, and because of the numbers involved, a slight improvement in teaching brings proportionately large returns. It is the aim of every chapter to aid the teacher in obtaining these returns.

The thoughtful reader will see that the theory and the practice here urged are dominated by the thought that high-school teachers will succeed in proportion to their knowledge of what individual adolescents really are and what they really need.

RALPH W. PRINGLE.

NORMAL, ILLINOIS,
March 1, 1927.

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METHODS WITH ADOLESCENTS

CHAPTER I

METHOD IN EDUCATION

I

In all lines of human endeavor, the world has ever been ready to depend upon new schemes and devices in attempting to overcome difficulties.

A few years ago, a group of high-school principals, most of whom were in charge of the larger high schools of central Illinois, met to discuss and study educational matters of common interest. Each in turn presented for discussion what he considered his major problem and explained the methods and devices that he was using in attempting its solution. The problems were all of the kind familiar to high-school teachers and principals of experience. Much of the discussion centered around the difficulty of raising and maintaining standards of scholarship in the large city high school. Two of the largest schools represented were in the throes of attempting to create higher ideals of school work among their pupils. The methods of attack were thoughtful and vigorous; and the results, if measured by higher average grades, were encouraging. The means employed were mostly negative administrative devices. Elaborate and thoroughgoing systems of reports concerning the failing pupils and their work were demanded from the teachers; these were made the basis of conferences with pupils and parents; then came many carefully planned follow-up schemes. All

the methods and devices described seemed practical and gave evidence of much earnest and intelligent effort to accomplish the desired ends; and they were commended by the educational expert in charge of the meeting. But is it not astonishing that throughout the entire half-day's discussion no mention was made of the most important and natural means of raising and maintaining standards of scholarship? No reference was made to any special effort put forth to improve the classroom teaching; yet all present were ready to admit that skillful teaching solves nearly all ordinary high-school problems.

Yes, all who give thought to the matter are convinced that skillful work in the classroom is desirable; but there are still many who believe with a writer in the *Atlantic Monthly* for January, 1923, that teaching is "purely a matter of personality and practice," and that a deep and broad knowledge of the subject, together with the enthusiasm which this knowledge engenders, is the only preparation needed—and this in the age of efficiency engineers who exhaust their ingenuity to discover the best way of doing even the most mechanical tasks! In trying to comprehend the mental workings of him who is so sure that there is no need for instruction in the art of teaching, one is somewhat tempted to conclude with Shakespeare that man is "most ignorant of what he's most assured." Many years ago Sir William Hamilton, a common-sense philosopher, gave us the simple formula, "All method is a rational progress toward a definite end." All through the ages it has been found a most difficult thing to secure rational, systematic procedure in all lines of human endeavor; it has been found difficult to make conduct continually subservient to a definite end, even when it has been possible to agree upon the desired end. As a consequence, there has slowly

evolved in nearly every field of effort a more or less complete set of guiding precepts based on principles believed to be fundamental.

As we watch and admire the skilled juggler who is able to keep four balls in the air, we may conclude that his deftness of hand is merely the result of patient and persistent practice which has established perfect muscular coördination suited to his purpose; but in this feat the end is definitely mechanical, a definite placing of the balls as to time and space. His art involves only the lifelong use of four balls, so managed as to meet the same physical conditions. Not so is the art of the teacher. The pawns with which he plays the game are human beings, all different and never twice alike; and it is his purpose to aid in a natural way the *growth* of knowledge, skill, power, character, and other intangible human qualities—a growth inconceivably subtle as to process and complex as to results; if successful, the teacher has performed a marvelous piece of psychical legerdemain, calling for all the help that can come from both principles and precepts.

During recent years, the leading topic in educational literature and discussion has seemed to be the curriculum; and the dominating purpose has been to select subject matter that will best reach certain cardinal objectives, variously stated, and largely determined by the pupil's social outlook. This has been inspiring work, and let us hope that the results will soon affect the actual work of our high schools. But this problem of the curriculum is not primarily one that the rank and file of our teachers are called upon to solve; theirs is the ever-practical problem of method, more delicate and difficult than that of any juggler.

II

Within a generation the demands for skillful teaching have increased greatly. Not long ago the high-school teacher's function was to teach only a very small percentage of the youth of the land, and these, for reasons well understood, the most teachable. A large proportion of these pupils were choice spirits, hungering and thirsting after knowledge; the children were of intelligent parents with an educational background. The other young people of high-school age either did not present themselves for instruction or soon left school for more congenial tasks than those furnished by the formal and more or less abstract subjects which they found in the curricula of the earlier secondary schools.

All this is changed. The forces operating to increase our high-school attendance, as in the case of any great institutional movement, are both numerous and complex. Some of the influences are the following: (1) the growing belief that it is a public duty to furnish a high-school education to every youth; (2) less industrial pressure, making it possible for the family to live without financial aid from the boys and girls of high-school age; (3) the introduction of vocational, semivocational, and prevocational subjects in nearly all of our secondary schools, making education seem more immediately useful and attractive; (4) the greatly increased attention given in the modern high school to the social needs of adolescents, as manifested by athletics and all the other varied extracurricular activities; and (5) the very momentum of the high-school movement, as reflected in the magnificent buildings, wealth of equipment, social recognition, and the various forms of publicity given it. According to statistics published by the Bureau of Education, the percentage of the total

population of the United States attending high school in 1920 was five and a half times that of 1890, by far the most rapid increase occurring during the last ten years of the period. For many reasons, the public high school has caught the imagination of nearly every class of people, and all are bent on securing a high-school education for their children.

From the standpoint of the student body, what is the meaning of this phenomenal increase in attendance? Its significance is greater than is yet generally realized. It means that there has been a rapid change from a select, homogeneous group to a heterogeneous group drawn from lower and lower social, economic, and intellectual strata of the communities. As the late Professor Inglis expresses it, "We have tapped successively lower levels of native capacity and acquired abilities." We are, therefore, face to face with the problem not only of teaching high-school pupils of much lower capacities, but of interesting and of controlling the efforts of groups of more varying ability, all grades of intelligence above the moron being represented. We have attempted to meet the difficulties inherent in the situation by expanding our program of studies, by adding many non-academic subjects, and by changing our textbook material, thus trying to provide the mental food suited to the capacities of all; but in the opinion of Inglis, "we have failed to adapt instruction to the varying capacities of those whom we have encouraged to attend the high school"; and he recommends that we either exclude those of lower intellectual ability or "see to it that they are afforded the sort of education suited to their capacities and needs." [1]

In the meantime, the public high school has undertaken as its legitimate educational activity to promote

[1] Inglis, Alexander, *Principles of Secondary Education*. Houghton Mifflin.

through its pupil population all such worthy propaganda and give instruction relative to all such citizen welfare movements as the more public-spirited enthusiasts of the community have seen fit, in the interest of "practical education," to thrust upon it. Such worthwhile extraneous matters as clean-up campaigns, instruction in fire prevention, thrift education and training, and safety-first agitation are in turn added to the regular teaching load. When administrative and community enthusiasm has subsided, these extras will doubtless yield place to other activities foreign to the original function of the school; and the teachers will continue to wonder what their jobs really are.

Again, it has been estimated that usable knowledge has increased more during the last half-century than in all previous history; and educational discussion usually implies that the high-school teacher must possess the most recently discovered knowledge in his field and with it enrich his regular lessons from day to day—a splendid pedagogical ideal, and a form of service that is likely to be appreciated.

But how is this influx of a lower grade of intelligence with the resulting extreme variation in capacity for school work, this loading of extraneous community tasks upon the high-school teachers, and this adding to the teacher's working equipment the new and ever-increasing mass of subject matter—how is all this connected with the subject of this chapter?

When because of changed conditions in the fields of commerce, industry, engineering, and scientific research, new difficulties have arisen, new and better ways of doing the work required have always been found. In like manner, the high schools must now vigorously and systematically set about inaugurating higher teaching standards; the development of more effective methods of presentation and a more genuinely

scientific classroom technique is demanded by the logic of the situation. The high school cannot, in this country at least, exclude the weak ones who come seeking help; and there is a limit to the doctrine of tempering the wind to the shorn lamb. It would be dodging the issue were we to resort to the policy of selecting and passing out educational pabulum suited only to babes. We cannot well turn a deaf ear to all the urgent, although sometimes unreasonable, demands of the supporting community. And the increasing knowledge of the world must in some way be assimilated. Hence there is no way for the high schools to meet the demands of the situation but by improving their teaching.

III

If this urgently needed advance in method and technique is to be certain and rapid, it must be based on some principle so fundamental and at the same time so precise as to leave little opportunity for serious blundering. The advance must be attempted in the spirit and according to the methods of modern science. What are the ways of determining educational procedure? There have been at least three courses pursued when the content of the curriculum, methods of teaching, or matters pertaining to management and discipline have been under consideration: (1) Tradition has often been appealed to; this may be dignified by calling it the "historical way." (2) In recent years much attention has been given to the immediate economic and social outlook of the pupils; this may be called the "sociological mode" of dealing with educational problems. And (3) for many years there have been some who believe that, by focusing upon the nature and capacity of the pupils and thus ascertaining their personal needs, we can best determine how and what to do for

them; this is clearly a "psychological mode" of procedure. The first way, although still used, is no longer seriously defended. The last two mentioned are both modern and scientific.

The names of great men are associated with the advocacy of the sociological mode of solving educational problems. In 1859 Herbert Spencer vigorously urged that the schools must be shaped to meet the social needs. Just forty years later, Professor John Dewey, in his *School and Society*, wrote: "Whenever we have in mind the discussion of a new movement in education, it is especially necessary to take the broader, or social, point of view. Otherwise, changes in the school institution and tradition will be looked at as the arbitrary inventions of particular teachers—at the worst, transitory fads, and at the best, merely improvements in certain details; and this is the plane upon which it is too customary to consider school changes." Dewey insists that any educational movement must "appeal as part and parcel of the whole social evolution, and, in the more general features at least, as inevitable." In 1912, David Snedden expressed the opinion in the *School Review* that "there is a growing demand, often inarticulate, in communities supporting [small] schools, that education must be measurably readjusted so as to serve more acceptably the actual needs of the community." In 1918, Inglis, in his *Principles of Secondary Education*, said, "The key to any analysis of aims in education is to be found in an analysis of the activities of life in which people do or should engage. The aims of secondary education, therefore, as of any other department of education, must be interpreted in terms of the activities in which individuals may be expected normally to participate." However, he conceded that a complete analysis of individual activities is impossible, and its results would be of questionable value, "since

it would deal with individuals whose lives could not be prophesied." In recent educational discussions, the influence of this principle, which determines the needs of the individual by the demands of society, is everywhere traceable; it assumes that we already have a firm grasp on the fundamentals of social economy and that we are justified in glorifying and appealing to the composite spirit of society for guidance.

Turning to the third controlling principle, which points to the nature and needs of the pupils, we find it, too, associated with great names. Rousseau and Herbart both advocated the thesis that educational matters must be settled in terms of the learner, always recognizing his interests, needs, and capacities. As we should expect, G. Stanley Hall was most insistent all through his voluminous writings that the psychology of adolescence should be appealed to in solving all problems relative to high-school education. The high school "should follow the nature and needs of youth far more closely than is necessary either before or after, make this work its vocation, and be the defender of this age against aggression." The only question "should be how best to serve one unique age of life, and thereby do the greatest good to the community." Dr. J. W. Slaughter, a student of Hall, urges that the "mind grows in terms of itself," and that "the stages of development are differentiated by new instincts, emotional adjustments, interests, and tendencies," and that "the school must be regarded as an environment suitable for the right utilization of these toward the final constitution of character and its value must be estimated by the degree in which it meets this requirement."[1] Professor S. C. Parker, in his *Methods of Teaching in High Schools*, urges the utilization of the pupil's interests. "When the school is adapted to

[1] Slaughter, J. W., *The Adolescent*. George Allen and Unwin, London.

social needs, it is endeavoring to accomplish certain fundamental human purposes which are paralleled by the student's interests. This is especially true during the adolescent period." In his book on high-school teaching, Professor S. S. Colvin asserts that "we must recognize the fact that the changes that occur with the coming of adolescence are sufficiently important to modify in many ways the subject matter of instruction and its method of presentation." [1]

The psychological mode of attacking high-school problems assumes that our increasing knowledge of adolescence is sufficient to serve as a guide and a working basis, and it leads to a helpful recognition of individual differences and an exaltation of individuality. Variations in human nature are wide and continuous at all times, but it is especially during adolescence that individuality develops, as a resultant of the mutual interaction between the surging internal forces and the newly interpreted external influences. The individuality of the adolescent is increasingly evident from its ever-varying and increasingly vigorous manifestations; and be it remembered that at no other time in life is the desire so strong to have and to keep one's uniqueness intact. All this tends toward the inference that, notwithstanding the claim that our high school should be an integrating influence, if our treatment of the pupils in the classroom is to be wholesome and effective, we must know and sympathetically recognize their natures in all their individual differences.

What, then, shall we conclude as to the relative merits of the two criteria under consideration? Both the sociological and the psychological principles appear to claim the allegiance of all who earnestly seek pedagogical guidance. The natural conclusion would seem to be to make use of both; when we come to closer

[1] Colvin, S. S., *Introduction to High-School Teaching.* Macmillan.

quarters, however, we may find that each is especially suited as a safe and practical principle to follow in the solution of certain classes of educational problems, discrimination in use thus becoming the part of wisdom.

A simple classification of high-school problems would include at least the following: (1) those involving the program of studies and the choice of subject matter; (2) those relating to management and matters of pupil control, including social administration; and (3) those pertaining to method of presentation and classroom technique.

Judging from the nature of the first class of problems, one may reach the conclusion that in the main they demand a far-reaching social outlook. He who would wisely determine the subjects and their content must be able to read the signs of the times, must be in step with "the general march of events," must appreciate the spirit of his age. This does not mean that the activities of the community from which the pupils come and the community to which they *may* return shall dictate as to either subjects or subject content; statistics are at hand which prove that in many parts of the country only a small percentage of Americans remain in the communities in which they were born and educated. Moreover, from the point of view of this book, it is difficult to conceive of a wise choice of subjects being made for high-school pupils without a sympathetic understanding of adolescent nature.

When we come to problems relating to discipline and social administration, nothing can take the place of an intimate knowledge of those whom we wish to control and serve. If we would shape it to its true purpose, we must always understand the nature and qualities of the material with which we work. Unless by accident, no one has ever appealed successfully to another without due recognition of his nature and interests.

In human beings all interests, and especially the many new and piquant ones of adolescence, are dynamic active tendencies. Some form of interest is always appealed to by people who deal successfully with their fellow beings; for example, successful diplomats, orators, politicians, promoters of all kinds, and salesmen. In this connection, it is worthy of note that nearly all the marvelous advances brought about in the treatment of plants and lower animals have been based on an intimate knowledge of their nature as learned through their life cycle. In short, success grows out of an accurate knowledge of the things with which we deal.

IV

More than a hundred years ago, Jacotot, a French educator of Louvain, reminded his generation (by whom he seems to have been considered a crack-brained theorist) that "verbs of teaching govern two accusatives, one of the person, another of the thing." During his whole life, this French professor tried to get his age to realize that the teacher cannot manage his two accusatives without twofold knowledge. Before the child-study movement, most teachers, especially in the colleges and high schools, held both in theory and practice that it would be disgraceful not to know history, algebra, or botany, but that it was professionally honorable to take James, Jane, and John for granted. To-day all teacher-training schools have courses in educational psychology, and many give special emphasis to the psychology of both the child and the adolescent. In fact, James, Jane, and John have been receiving so much fervid attention in recent years that they may well feel a bit uncomfortable. However, for the basis of discussion in this book, there is a considerable body of knowledge that has resulted from

the many forms of study applied to adolescence. These studies have included extensive laboratory investigations relative to the various aspects of learning and a large body of analytical discussion concerning laboratory results; the aim throughout the book is to relate what has been found to methods of teaching. Of this we may be certain: If there ever is a psychologically sound pedagogy, that pedagogy will be the ideal; and, when applied, the powers of the learner will be developed to their limits.

Specifically, in what ways may the young or prospective teacher profit from a psychological approach to his classroom work? (1) He should acquire principles on which to build better methods of teaching. (2) He should have a basis for understanding and interpreting successful teaching methods, from whatever source they may come. (3) He should gain a working theory of education whereby he may better appreciate those larger educational problems that are indirectly connected with his immediate classroom problems. (4) He should better understand the relation between education and the other social forces. And (5) less specifically, he needs his psychological studies to aid him in fixing a point of view and forming a background for his educational thinking. As Principal T. J. McCormack expresses it, one should be able to form a judgment concerning the best in method "without collecting statistics and sending out hundreds of *questionnaires* to people manyfold more ignorant than himself. Truth and values are not reached by popular referenda."

The high place here given to psychology, and especially to adolescent psychology, finds support in the doctrines of the "new education," which teaches that the nature of youth, his active interests, and the conditions which surround him should determine each stage of his development, rather than any ideals as

to what a mature person should be or do. The question is not what will be of most value to the youth when he grows up, but what is of most interest to him now. He has a right to be occupied with things that are now meaningful to him. In other words, what will stimulate him to use all his powers most vigorously? This means that the teacher's chief concern is with the natural adolescent instincts, impulses, intellectual interests, ideals, and tendencies of his pupils, rather than with carefully correlated courses of study and logically thought out methods of presentation; there is a correlation of interests and activities as well as of subject matter. It has occurred to close observers of adolescents, however, that their natures are effectively selective. The ideas and things which do not meet their natural interests get scant attention; and even hard facts, in the face of proverbial juvenile stubbornness, cannot be intruded.

If it be not fact for me,
What care I what fact it be?

Thus the youth goes forth somewhat protected against the blundering of adults who would thrust upon him the things which measure up to the standards of adults and minister to their peace of mind and comfort.

This does not imply that the high school is freed from the task of thoroughly preparing its pupils for the duties and responsibilities of adult life; on the other hand, the doctrine is that the school must better prepare them to meet the emergencies and vicissitudes of life by training all their powers, all their capabilities to maximum efficiency. As in moral education, the indirect method is more effective and trustworthy than the direct. If this doctrine is sound, perfect art and technique in teaching would result in each pupil's being led to express his better nature to its full capacity; and

conversely, this complete expression would be the proof of perfect skill in teaching. Expert familiarity with the nature and needs of youth and the skill to use this knowledge would constitute a truly professional high-school teacher. Thus it has come about that "the accusative of the person" following the verb "teach" has been exalted to a degree that would, perhaps, fully satisfy the enthusiastic Jacotot.

V

This theory of education appears to demand a restatement of the purpose of our secondary schools. As already noted, the last half-century has witnessed a doubling of the world's knowledge; and writers on educational subjects assure us that it is the function of the schools, especially the high schools, to pass on to the pupils the spiritual heritage of the race, so that nothing may be lost that makes for either individual or social welfare. Now "spiritual heritage," notwithstanding its vagueness, sounds well and makes a suggestive caption; anything that we can inherit appeals to our natural cupidity, provided it can be appropriated without great effort. But the world's heritage of useful knowledge has so increased that the pedagogical machinery for passing it on is about to be overwhelmed; at least, so it sometimes appears to the modern curriculum maker, who of late dominates educational discussion. Again, not less rapid than the expansion of knowledge has been the increase in the complexity of society, so that those who would make it the purpose of the high school to prepare its pupils for the needs of society, or to train them in social efficiency, must realize that the increasingly complex nature of our social order will result in an increasingly perplexing burden.

Thus to escape these two growing difficulties: namely, coping with an enlarging body of useful knowledge, and ministering to individual and social demands, we are persuaded to turn to the newer educational thought for a new statement of the purpose of the high school. Dr. Slaughter thus formulates it: "Secondary education must, so to speak, be put on its trial, and justify its claims to be a regimen suitable for adolescent needs. The teacher should realize that his responsibility is to the youth and not to any conventional system or set of ideas, and that his work is to be estimated finally in terms of the human product and not in terms of place on examination lists." [1] This way of announcing the purpose of the high school seems to remove the necessity of distinguishing sharply between "vocational" and "liberal" education. "The whole question of what are liberal and what are vocational studies," according to Professor E. P. Cubberly, "can be defined accurately only in terms of individuals. What is vocational for one is liberal for another." Thus again it appears that the purpose of the high school is to develop the individual pupil according to his nature and capacity; that is, to see to it that there are as few undeveloped brain cells as possible, to supply the stimuli needed to call into action and foster the most human and worthy instincts and impulses, to exercise the various mental powers according to the best experimentally determined methods, and to aid and inspire in the building of ideals and standards. Thus the results are to be largely subjective and of a kind not easily measured by any immediate and direct test. Since the amplest self-realization attainable by each pupil is the aim, what would the pupils' scores be if a given group should attain this?

To many readers this statement of the purpose of

[1] *Op. cit.*

secondary education doubtless appears intangible and lacking in definiteness, as compared with either (1) a specific outline indicating that portion of the world's vast store of knowledge that the high school must transfer to its pupils or (2) the particular form of civic, industrial, economic, and social training that it is expected to give. To certain types of mind the intangible and the indefinite are not satisfying or helpful. But we must remember that in the classroom, with twenty-five lively adolescents before us, we are dealing with that intangible, indefinite, evolving thing we call *life;* we are face to face with the vital, and the vital implies the voluntary. Wherever we find it, "the rôle of life," as Bergson affirms, "is to insert some *indetermination* into matter," [1] that is, something unforeseeable. Individual life in its entirety, regarded as a creative force, transcends all advance definition of its modes and the material with which it best works. Thus is it not somewhat presumptuous on our part, is it not what we sometimes call "bluffing," to pretend to predict just what an evolving life will need at all stages, just how its unique evolution is to be managed, and just what definite goal it must ultimately reach? True, life has its logic (otherwise all would be chance); but its logic is vital, rather than academic, and the premises and conditions are not attainable thus far by any investigation; no static concept can be given a place in life's formulas; all is dynamic and moving, and real teaching is life answering to life.

If the high school is to measure up to its purpose as here set forth, the recitation period must have elements of surprise, as it were, for both the pupils and the teacher, who must remain youthful in spirit; there must be that dramatic interest, that spirit of intellectual adventure, which comes from dealing with

[1] Bergson, Henri, *Creative Evolution.* Holt.

the unforeseeable. Both in school and out, it is in this zone of the unexpected, the uncharted part, that the interplay of formative influences takes place. Was it not said long ago that "the letter killeth but the spirit maketh alive"?

VI

The discussion thus far has led to the conclusion that the high school which accomplishes its purpose must select such subject matter and so present it that the pupils will develop, through self-activity, all their powers to the full. This is according to recent educational theory. It is the purpose of this book to deal with methods of presentation. A decision must be made as to whether most help for the teacher can be given by presenting, discussing, and illustrating the general principles that are believed to underlie all high-school teaching or by dealing with the major high-school subjects separately and attempting to show specifically how each subject should be taught in order to accomplish the purpose of the high school. A choice must be made between general method, with its advantage of economy in statement and discussion, and special methods, with their direct attack on the teaching process appropriate to each subject. Dr. Bagley has said there is no such thing as "general method," that it is a misnomer. This denial, perhaps, implies that all fruitful discussion of method must have as its basis concrete situations; that is, all general principles pertaining to method that can be expected to prove helpful must have an inductive origin and embody merely the results of successful teaching of specific subjects. Clearly there is a chance for a difference of opinion as to the pedagogical efficacy of general method as applied to high-school teaching. As shown by Dr. Franzen's study, nearly all teacher-training institutions

offer both general and special methods courses in teaching high-school subjects.[1] A glance at the table of contents will tell the reader that, with the exception of the first three chapters, this is a book dealing with methods applied to special high-school subjects.

"By method in education," says Professor E. L. Thorndike, "is meant the way in which a teacher puts educational agents and means to work upon human nature so as to produce some desired result."[2] We have tried to agree on the desired result; the following chapters are devoted to attempting to show how the various high-school subjects may be made the means of helping to produce this result.

Probably the quickest and surest way of teaching high-school method, as applied to any particular subject, is to teach that subject to the prospective teacher by the desired methods and at the same time systematically to make the learner conscious of the methods used and conscious of the psychological justification as applied to adolescents. It will not do to leave these details of method in the background to be detected and appropriated by those who are able. As stated in the survey of the Missouri normal schools published by the Carnegie Foundation, "The very essence of the artistry of teaching, as in other fields, lies in the fact that the elements which make it up are hard to detect. One looking upon a fine bit of teaching is likely to be impressed by its apparent simplicity, and to conclude that after all any one could do as well,—just as one is likely to gain a similar impression from observing the finest acting or listening to a good public speaker." Athletic coaches, gymnasium directors, teachers of swimming, and music and art teachers show by ex-

[1] Franzen, G. F., *A Comparison between General and Special Method Courses.* University of Iowa Studies.

[2] Thorndike, E. L., *Education.* Macmillan.

ample how the thing is done, explain the way it is done, and call attention to the underlying principles. The total effect of mastery in teaching, as it appears to the observer, is not enough. In the interest of independent effort and flexibility, the inexperienced teacher needs to know the science that is the basis and justification of the art. To this knowledge is added practice teaching in training schools under close supervision.

For many reasons, only a few high-school teachers are able to receive this complete preparation for their work. What can the others do that will aid them in their chosen profession? At the time of the Missouri normal school survey, questions relative to the courses that had been most helpful were sent to the teaching graduates of the schools. These were teachers with from three to twenty-five years' experience. The combined responses of one hundred and sixty-three teachers ranked the courses listed as follows: (1) special method, (2) general method, (3) psychology, (4) practice teaching, (5) school administration, (6) school management, (7) observation of teaching with discussion, (8) city or state course of study, (9) history of education. Thus in the opinion of these experienced teachers, courses in special methods constitute the most effective kind of help. From the point of view of this book, these courses for the teachers of high-school subjects should be taught in the light of what is known concerning the nature and needs of adolescents, making use of all that has been experimentally determined relative to the best methods of teaching the subjects; that is, the nature of the one taught is the determining factor as to both subject material and method. For those who now are teaching or who plan to teach high-school boys and girls the following chapters were written. But no reading or study of methods will take the place of a sympathetic understanding of each pupil. As Pro-

fessor Thorndike has said, "The teacher who has not learned by ordinary experience that each child is to some extent a separate problem, demanding for his best interest an educational theory and practice to fit *him*, should learn it once for all from psychological theory." [1]

It is the purpose of the next chapter to attempt to lay a foundation for the study of each pupil by a statement of the most common intellectual characteristics of adolescents, thus supplying a groundwork of psychological facts and principles.

[1] Thorndike, E. L., *Individuality*. Houghton Mifflin.

CHAPTER II

THE ADOLESCENT INTELLECT

I

It is a fact well established that psychological growth proceeds upon a physical basis. Whenever there are marked psychical developments, we may be certain there are going on somewhere vigorous physical changes. The relation between these two classes of phenomena is causal; whenever the physical is interfered with, there follows a corresponding psychical result. This relation between the physical and the psychical is too well known to make illustration necessary.

The mental, social, and moral developments that are normally due at adolescence are in no way exceptions to the foregoing general statement. The driving force on the physical side at this time is the growth and activity of the ductless glands and the resulting rapid development, both structural and functional, of all the organs involved in reproduction. Anything that in any way interferes with the maturing of sex life delays all adolescent psychical traits. There is a small structure known as the pineal gland located on the posterior side of the brain stem which normally disappears at puberty and becomes filled with a calcareous substance. If the function of this gland is disturbed during childhood, there begins a rapid development of the reproductive organs and an unfortunate case of premature adolescent development and precocity sets in. This illustrates interference with what seems to be an inhibitory organ directly connected with sex

development. All recent studies show conclusively that the growth of the reproductive glands and ovaries control the development of the secondary sex characters. This marvelous control is brought about by means of the internal glandular secretions that are poured into the blood. Hence, anything that affects the quality or flow of these secretions results in a corresponding interference in the development of the secondary sex characteristics which are the characteristics of adolescence. This further illustrates the causal relation between mental and physical development.

From this it would appear that a complete account of the growth and the maturing of the adolescent intellectual powers must include a description of the normal physiological development of this period; however, the present account of the adolescent intellect will include only a brief description of some of the changes that occur in the brain. It is a common belief, held for centuries, that the brain is the physical basis of the intellect, and science has not disproved it. Because of this relation, the adolescent development of the brain would seem to be of much interest and significance.

II

When we think of the rapid physical growth that occurs during the early years of adolescence, we might naturally expect a corresponding increase in the size and weight of the human brain; on the contrary, the brain reaches nearly its full size before adolescence begins. But when we turn our attention to the internal structure and development, we find changes both marked and significant. If we could know the whole story of these changes, we should doubtless discover a physical basis for all the new intellectual phenomena to which we are now to turn our attention.

Brain tissue is composed largely of cells and fibers; the same is true of the entire nervous system. The unit of this system is the *neurone*. A complete neurone consists of (1) a cell, which contains a nucleus similar to that of other cells; (2) the axone of the cell, which is a slender fiber growing out of the cell and varying in length from a small fraction of an inch to more than a yard; and (3) the dendrites, which also grow out of the cell and divide indefinitely. There are two exceptions to this statement concerning dendrites. Sometimes they are lacking altogether, and the dendrites of the spinal cord leading toward the brain consist of a single fiber which closely resembles the axone. This much in general with regard to the internal structure of the brain. Now what structural change occurs during the oncoming of adolescence?

At birth the number of cell bodies are believed to be practically complete, although many are represented by mere granules. According to Kaiser, the number of active cells nearly doubles during the first fourteen years. It is not probable that new cells are formed, but that cells are developed from granules. Since cells constitute a relatively small part of the brain, there can be a great increase in their number without a corresponding increase in the total size and weight of the brain. The "evolution of mass" characteristic of childhood seems at adolescence to pass over into the "evolution of texture." This applies especially to the evolution of the brain fibers. The several systems of fibers connecting the cortical cells become more complex during adolescence, and they continue to develop later than is generally supposed. These tangential fibers, as they are usually called, increase steadily in caliber and number for many years after eighteen. Both Kaes and Vulpius maintain that the later teens are epochal for important developments.

The evolution of the fiber systems of the brain seems to be more closely connected than the development of the other brain structures with the increase of intelligence which is due at adolescence. It is significant that any checking of this fiber growth due to poor nutrition produces a corresponding retardation of mental development. So there would seem to be reasons for the inference that the marked desire of the early adolescent to exercise his mind on the cruder logical processes, as well as his shadowy reaching out for new concepts, is the psychic functioning of the neural development just described; in other words, that mental growth proceeds on a physical basis.

III

It is the purpose of this chapter to describe the intellectual development that naturally occurs throughout the adolescent period. The account may well begin with a brief mention of the status of the intellectual powers during the three or four years preceding puberty.

The time of life generally known as "preadolescence" is unique, especially in its physical characteristics; but the mental traits of the period are also well marked and significant for the purposes of education. Efficiency within pretty definite limits characterizes much preadolescent effort both physical and mental. Boys and girls from eight to twelve are more nearly alike in this characteristic than they are during any later period; they seem nearer the racial type. This relative lack of variability makes possible considerable definiteness of statement concerning the traits of this period.

Perception, especially through the eye and ear, has reached a wonderful degree of perfection; the preadolescent is keenly observant of detail. The use of all his powers of perception naturally brings great joy

and tends to make the use of books distasteful. The books that do appeal to him, as well as many other indications, suggest that this is an age of prose. His reproductive memory is good; it acts quickly, and impressions are enduring. Thus verbal learning is easy and usually not distasteful. Visual imagination, when dealing with things of immediate and personal interest, is vivid and grasps its object firmly. Much of the reasoning at this time is likely to be limited to concrete situations and proceeds on a practical basis. Although the preadolescent's thinking is sometimes peculiarly subtle, his thoughts are often crudely illogical. Insight in the deeper sense must not be expected; the inner meaning of things fails to catch or hold his attention. The *how* and the *what*, rather than the *why*, make a strong appeal.

The preadolescent readily acquires the tools and the elements of his future knowledge, and this he does apparently with considerable satisfaction; but there are many indications that these acquisitions, so important for his future needs, are for the present practically without content. To this statement, at least two exceptions should be noted. The boy from eight to twelve revels in outdoor nature when his surroundings permit it; and boys and girls alike are always delighted with suitable stories—stories of adventures, heroes, and exploits. For the preadolescent both nature and story have real content, hence immediate educational value.

The way the mind of the preadolescent works and his practical attitude toward everything that affects him suggests that methods of instruction and the manner of dealing with him may be quite dogmatic. This treatment, although seemingly unpedagogical, he does not resent. He readily submits to drill in the mechanical processes and profits by it. Likes and dislikes at this time seem to affect the learning process

less than they do in later life. Much of the teacher's energy may well be spent inciting and inculcating, as distinguished from teaching in the higher sense. Authoritative and dogmatic treatment gets results; hence appeals to the preadolescent's practical view of matters.

This brief account of boyhood and girlhood will furnish contrasts to be noted by the student of the adolescent intellect. Although some of these exhibitions of differences between this period and adolescence are marked, the reader is not to understand from the account here given that any sudden or dramatic change takes place. The earlier period is preparatory for the later period and gradually, yet sometimes with seeming rapidity, flows into it. In fact, there are measurements of intelligence, like those of L. M. Terman, that appear to indicate that adolescent mentality can be foretold with some degree of certainty from carefully conducted tests during preadolescence, the only marked exception being feeble-minded children, whose I. Q.'s generally show a relative decrease. Successive examinations seem to show variations as follows: the I. Q. of girls varies more than that of boys, superior intellects more than average, and older children more than younger. But, in general, through all the developments, mental growth correlates closely with physiological growth, physiological maturity being decidedly evident in changed mental and especially social attitudes characteristic of adolescence. The mental growth and reconstruction which we are now to study manifests, as will appear, a gradual changing of attitude toward life and nearly all its interests.

IV

The internal development of the brain, which was briefly described in an earlier section, and the secretions poured into the blood from the ductless glands con-

nected with sex life probably furnish the most immediate physical basis for distinctly adolescent traits, including the mental development peculiar to the period. A more comprehensive statement would be, that all physical development, especially of nerve tissues, muscles, glands, and blood pressure, has its concomitant mental unfolding. In the maturing of brain cells and the extension of the fiber structures of the neurones already referred to, we seem to find a physiological explanation of the appearance of such traits as disinterested curiosity; the marked increase in the associative function of the mind; the greater "susceptibility to the larger concerns and issues of life," to quote Professor Dewey; the new interest regarding the inner meaning of things; and in general the many manifestations of a larger spiritual life. Adolescent mental maturing always follows and requires more time than the corresponding physical development, and there comes a time with many youths when the physical changes are overshadowed by the psychic changes.

Careful measurements of the parts and organs of the body show that their growth is uneven, one part or organ apparently getting a monopoly of the blood supply and forging ahead of the others. To a certain extent, something similar to this occurs in the maturing of the various functions of the mind, resulting in a temporary lack of mental perspective. The adult observer often interprets this phenomenon as whim or caprice, and sometimes cracks his joke at the youthful enthusiasm which naturally accompanies this erratic mental unfolding. To the adolescent himself and to the one who appreciates its significance, this seemingly freakish intellectual growth is no joking matter, but an opportunity to initiate and foster some worth-while life interest; here, as elsewhere, nature is too suggestive

to be ignored; youthful interest points the way to a youthful need.

In the writings of the earlier psychologists, it often seems to be implied that the human mind is little more than a congeries of uncoördinated faculties and that a knowledge of the more purely intellectual powers constitutes the important part of psychology. But as we approach the present time, the idea of a complete and thoroughgoing unity of human nature is increasingly expressed or implied. This conception of the human mind in general is not now questioned, but the doctrine acquires greater force and significance when applied to adolescent nature. Here the ego responds more readily and completely than at any other time to every impulse, whether its source be mental or physical; so vital is the unity that the entire being is involved in every learning process. All who have lived and worked with adolescents know that the instincts, feelings, and emotions are deep and absorbing and that they often seem to have a strange dominating influence; in many individuals, they appear more nearly to comprehend the most common racial characteristics than any other soul state. Any account of adolescence that attempts to furnish an adequate basis for the discussion of high-school teaching must include the instincts and emotions, as well as the more purely mental traits which seem to be more directly concerned with the pedagogy of secondary education.

V

The following description will make clear to the reader the reasons for beginning with an account of the instincts which hold sway during early and middle adolescence. Early writers on the subject appeared to be possessed with the notion that instinctive behavior belongs almost exclusively to the lower animals. Re-

cent students of the subject claim for man instincts more numerous and more subtle. In a certain sense, it is true that the instincts are more transitory than some of the purely intellectual processes; but since the appearance of the writings of Schneider, Hall, James, Preyer, Thorndike, and others on the subject, educators have been convinced that man has a large repertoire of instincts and that in character determination they are basic, hence that they greatly influence active interests and thus control human conduct. Acts and objects are instinctively attractive or repulsive; hence instincts are basic in the matter of attention, and they give force and vitality to both thought and action. This means that, in securing both immediate and ultimate educational results, the successful teacher does his work in the light of an intimate knowledge of the large part played by the human instincts; the born teachers have always done this.

If the foregoing holds true for educational efforts in general, none will gainsay it when applied to secondary education. In the latter field we are in the presence of new instincts, or at least instincts which function in a new way; these, in their more remote ramifications, urge their possessor toward a relatively new world of thought and action; there is a bewildering mingling of the old and familiar instinctive tendencies with startlingly new and strong impulses. The one who guides the youth must be aware of these hereditary currents and countercurrents and whither they are tending. The high-school age is preëminently one of emotions and ideals; and at the core of every emotion and ideal, if sufficiently analyzed, will be found one or more instincts; hence the basic nature of adolescent instincts.

In discussing a concept as subtle and potent as an "instinct," it is well to mark clearly its limits. Instincts are more easily defined than classified. The

confusion in the use of the term has usually been in connection with "reflexes" on one side and with "habits" on the other. What are the lines of demarcation between reflexive, instinctive, and habitual actions? They are all fundamental to any study of psychology. Although they are readily defined, there is no sharp line of division between them; one grades into the other. A reflexive act is usually understood to be "a simple inherited mode of response"; it consists of muscular and glandular activity, consciousness not playing any guiding part. Thus a reflex is not a state of consciousness. It seems to be the simplest mode of involuntary response under the control of the nervous system. A familiar example is involuntary winking. With this idea of reflex in mind we can build our definition. Instinct is a series or chain of reflexes, coördinated in such a way as to lead to some seemingly purposive action. Like the reflexes, the coördination of the reflexes is inherited. This way of defining the term reduces the concept to its simplest form and eliminates the popular meaning of instinct as a blind impulse impelling toward some action. Instincts are usually thought of as cravings, desires, appetites, imperatively calling for relief. This seems to confuse "the inherited coördination of reflexes" with the emotion which usually accompanies the inherited mode of behavior. For our purpose in this chapter and frequently in the succeeding discussions, it will not always be necessary to separate the instinct under consideration from its resulting emotions. An instinctive action may be detected by the universality of its occurrence in a variety of human beings. It may also be detected because it is, from its very first appearance, relatively perfect. All normal babies take their milk with an equal degree of skill. It only remains to distinguish habits from instincts.

Habits, like instincts, are coördinated reflexes, but not inherited. They are always acquired (in the service of instinctive promptings) through experience, they are usually less complex, and they are much less impulsive.

The list of human instincts here described is, according to the best authorities, far from complete; the account is confined to those instincts that either appear or become modified during adolescence and to those that are significant from the point of view of secondary education.

1. For the purposes of this chapter by far the most fundamental and hence important instinct is that of sex. This instinct, when it makes a normal appearance, is the real basis and driving force below and behind all the other manifestations which accompany and characterize adolescence; that is, it is causal in its relation to the physical and mental developments peculiar to the period.

The zoölogist in his discussions separates very distinctly the instinct that is directly concerned with the reproductive process and the accompanying traits which are only remotely connected with the functioning of sex. Such adolescent manifestations as increased attention to personal appearance, the desire to widen one's social horizon, and the effort to attract the attention of the opposite sex are secondary sex characters. Moreover, all the processes of mental reconstruction that belong strictly to the period and follow the appearance of sex life may logically be regarded as secondary sex characteristics; for whenever sex maturing is interfered with or is in any way abnormal, the mental unfolding peculiar to adolescence is invariably aborted in a corresponding way. Thus from this point of view, the secondary sex characteristics on the intellectual side really constitute the subject of this chapter.

The sex instinct conforms closely to the definition of instinct already given. The physical stimulus which starts the appropriate series of coördinated reflexes, in the case of males, is the secretion accumulated in the matured seminal vesicles. Whatever students may finally conclude relative to Freud's contention that the beginnings of sex life reach far back into childhood and that sex gradually matures during the years previous to puberty, for pedagogical and practical purposes we need not be concerned with this instinct until the onset of adolescence, for not until then does it manifestly affect the developing life of any individual. Although no phase of human life moves forward in a saltatory manner, but, like other things in nature, flows on like a stream, the sex instinct, at least in so far as it reveals itself in a practical way, does seemingly make its appearance, as even Dr. E. L. Thorndike admits, "like a dramatic rushing upon life's stage." The florist without doubt would say that the bud has its beginning far back in the life history of his plant and that it develops gradually for weeks before the day of its sudden opening; but he would also tell us that, from his point of view as a raiser of flowers, and from the standpoint of the flowering plant itself, the significant and dramatic day in the life of his plant is the day of its florescence; it has now reached the end of a cycle and is ready to reproduce its kind. Is it not somewhat the same in respect to the flowering of manhood and womanhood? A time comes when the long antecedent physical development emerges rather abruptly, prepared to function in a new way; the abruptness of this phenomenon is apparent to those whose business it is to deal in a practical way with maturing youth, and, judged by the disturbing effects, rather abruptly from the standpoint of many adolescents. No one who year after year has observed the emergence of this instinct and the

accompanying mental and social developments, as exhibited in high-school pupils, can doubt that all those whose work it is to teach and control these pupils have a task that is conditioned very largely by the nature of the changes that parallel the advent of the sex instinct. If the nature and characteristics of this period are not understood and appreciated, some degree of failure is inevitable. Of this the writer, whose work is the supervision of student teaching, has abundant proof at the beginning of every school quarter, especially when initiating the high-school teaching of experienced elementary teachers. From all this it appears that the mere question of abruptness is not a practical consideration.

However, it is a practical pedagogical consideration that this vigorously functioning and all-pervasive instinct occupies a very large place in the thoughts and feelings of the normal adolescent and gives tone and color to his whole horizon. This is but another way of saying that all strictly adolescent traits are secondary sex characteristics. Hall compares the secondary sex traits to the long-circuiting of an electric current. He also speaks of them as the "irradiations" of the sex instinct. Both metaphors are helpful. The first emphasizes the idea that youth is made safe from the dangers incident to this time of life if the marvelous stream of energy can be shunted and made to function in wholesome social and intellectual activities; the second metaphor gives expression to the positive view of the matter, that is, to the encouraging doctrine that the great flood of energy that is now impelling youth in many new directions can be made to tone up, beautify, and give significance to many phases of life and to the formation of character. The opportunities and possibilities for individual social and mental development that grow out of the ramifications and

irradiations of the sex instinct, if fully understood, would supply an adequate psychological basis for the complete education of the adolescent. From this source, too, must come the elements that blend in a forceful, pleasing, well-rounded personality; and it is during the later years of adolescence that the will-attitudes get the final set.

2. Self-assertion is frequently named as an adolescent instinct. There is, of course, a chance for argument as to whether this prominent trait can strictly be classed as an instinct according to the definition already proposed. Then, too, it may surprise those readers who have much to do with the irrepressible preadolescent to find self-assertion listed with adolescent characteristics. At any rate, self-assertion assumes new and vital significance as an impelling power and controlling influence during early and middle adolescence. The new forms in which this trait appears have their origin in the driving force supplied by the unfolding sex instinct and the increasing mental powers which accompany the maturing of sex. In other words, there emerges at about the same time a new form of energy and an improving mechanism for the use and control of this new energy; hence, there is a strong tendency, seemingly instinctive, to give scope to this new energy, the result being a new kind of social and intellectual assurance that appears as self-assertion. It is not necessary to point out in detail at this place the importance, for purposes of secondary education, of these instinctive promptings. This is the time for the individual to free himself from the trammels which have of necessity controlled his thinking and his conduct. The soul must now assert itself to the extent of a new intellectual and moral birth; otherwise the man or woman never appears. The materials and methods that the modern high school may use in aiding this

"new birth"—a term now the object of many a sneer from the psychologists—will be the subject of all the following chapters.

3. In the domain of the intellect, there appears a new kind of curiosity which seems fundamental enough to be called instinctive. "Curiosity," according to Bagley, "as an adaptive instinct expresses itself in the unreasoned impulse to investigate,—to determine the nature especially of what is new and strange in one's environment,—without conscious reference to the use to which the knowledge thus obtained may be put." [1] Preceding the ages of twelve to fourteen, there often exists a restless, pushing, almost insatiable curiosity; but this is a curiosity that largely concerns itself with facts. As R. S. Bourne suggests, the child is "too busy drinking in facts to wonder about them." [2] His curiosity is satisfied when he knows a fact and how it will serve his purpose. Not so with the youth; if he is vigorous, he is possessed with a strong craving to know *why* things, and especially people, are as they are. He must get behind the scenes, he is deeply interested in theory, and he begins to build his "philosophy of life." The adolescent rather suddenly develops an interest in both physical causes and human motives. The significance of this interest in the life and training of youth is so apparent that its pedagogical application may be readily made in the proper places. Bagley asserts that curiosity is as instinctive as hunger and that "the spur of curiosity has been perhaps as powerful a force in the progress of the human race as the spur of hunger." [3] From the teacher's point of view, the same may be assumed concerning the progress of the individual; no real teacher neglects this instinct, which

[1] Bagley, W. C., *Educational Values*. Macmillan.
[2] Bourne, R. S., *Youth and Life*. Houghton Mifflin.
[3] *Op. cit.*

supplies at all times the basis of natural and strong incentives.

4. The next adolescent instinct to be noted is somewhat suggestive in its pedagogical bearing. There appears to be little doubt that the migratory instinct, which is a very complex impulse, has its roots in the sex instinct, at least as it manifests itself during early adolescence. The instinctive nature of this strong desire to seek new surroundings and strange people seems to be established by the fact that there is generally no real reason for the youth wishing to leave a happy and comfortable home and by the frequency of the occurrence of this *wanderlust*. Thorndike has described the "gentleman of the road," who tramps simply and purely for the love of it and who is unable to conquer his "passion for roving." The instinctive promptings have become a habit of life so thoroughly ingrained that, if he reforms, "he is a most cast-down person." Any one who knows youth is aware of the prevalence of "spring fever," which is both biologically and psychologically interesting. L. W. Kline believes that there is often a connection between truancy and the migratory instinct. Many schools in Europe and a few in this country have been able to turn this instinct to account by arranging many kinds of study trips for the pupils, the possibilities of which will be discussed later.

The last four adolescent instincts to be described are often grouped together as social instincts. When analyzed, they are found, like the others, to have their origin in the maturing of sex life. Any phase of youth that is social in its outlook is important. If present before the beginning of adolescence, these instincts are relatively weak and insignificant; the preadolescent is egocentric, while the adolescent is naturally heterocentric. "The adolescent," according to Whipple,

"is shot through with the consciousness of self as related to other persons." [1] These group instincts resemble each other in being relatively slow in developing; for many contradictory preadolescent traits carry over into the period of youth, and there is often a strange vacillation between the social and antisocial instincts of the two periods; thus these beautiful human traits that bud at this time are often plants of slow growth.

5. Man as well as the lower animals quickly becomes very restless and unhappy when cut off from social intercourse with his kind; he is instinctively and strongly gregarious. This instinct tends to break down caste and social distinctions of all kinds. Solitary confinement is found to be the most distressing form of punishment; men break their bonds at the risk of life. No human institution has prospered or long continued its existence when entirely lacking the social element. Youth has contrived many schemes—parties, picnics, clubs, and the like—that he may gratify his gregarious impulses; and the adult has his county fair, café, boulevard, lodge, and church, all fundamentally social.

Before the advent of adolescence, the boy or girl is satisfied with a relatively narrow social horizon; the girl is happy with her little group of friends, and the boy's social needs are adequately met by his gang. Both find much of interest in the home, and parents are wont to rejoice in the domestic proclivities of their children. Then, with the oncoming of adolescence, there is for a short period a strange drawing apart of the sexes. The boy especially is extremely self-conscious and lives in fear of blundering; the physical and mental changes through which he is passing are too much for him, and he fails to find his social equilibrium; for a short period he seems antisocial. But this spell of social inhibition is suddenly broken. The youth

[1] Monroe, Paul, *Principles of Secondary Education*. Macmillan.

must have society, and he much prefers people of his own age. Now his parents are troubled about his desire to be ever on the move and his apparent lack of appreciation of them and his home. He feels that his group understands him and life in general better than any adult. He prefers to pass much of his time with kindred spirits, and he is likely to spend much of the remainder of his waking hours living over in imagination his social experiences and planning others. His past and future activities must have a social setting. If this social instinct functions fully in a wholesome manner, important individual developments are made possible. If the urgent social proclivities are neglected or thwarted, some form of social inefficiency is the result.

6. Sympathy is perhaps the most human of all the social promptings. As the Greek word indicates, the full development of this instinct enables one to "feel with" others, to enter appreciatively into their experiences. Dr. Bagley believes that "the sporadic instances of impulsive sympathy" in young children do not go counter to the conclusion that "the instinctive core of sympathy that runs through the higher types of social ideals is probably closely related to the sex and parental instincts," and that "such ideals do not function prior to adolescence." [1] High-school pupils frequently show both the disposition and the ability to enter whole-heartedly into the emotional experiences of others, especially when one of their number or a teacher is in trouble; and they always find concrete ways of giving expression to their sympathy. The appearance of this instinct furnishes a psychic basis for many kinds of moral training. Without this delightfully human trait, there would be little ground for morals, either in theory or in practice. A whole group

[1] *Op. cit.*

of altruistic social virtues, such as kindness, tenderness, charitableness, and the comparatively modern virtue, philanthropy, has an instinctive origin. Nearly all people who deal successfully with their fellows are strongly sympathetic—for example, the successful ward politicians and the most effective teachers of all kinds.

When this instinct appears in great vigor, as it often does in rapidly maturing natures, it profits by adult attention and guidance. It may degenerate, during efflorescence, into mere sentimentalism; it may atrophy from lack of proper objects on which to exercise itself; or it may enter narrow and fetishistic channels. Like other instincts, sympathy cannot safely be taken as the sole guide to action; reason must step in and aid in determining the wisest and most helpful course to pursue. The one who undertakes to help in the proper development of adolescent sympathy must be quick to make nice distinctions between the outpourings of mere feelings and the practical outcome of the instinctive effusions. The youthful intellect must be continually called into play and made to focus on the well-being of those whose experiences or conditions give rise to the sympathy. In the last analysis, unwise sympathy is really a form of selfishness, merely affording satisfaction to the one who indulges in an outpouring of soul, such as the pampering of children by fond parents. But when sympathy is seasoned with sense, it resembles mercy. It is twice blessed; "it blesseth him that gives, and him that takes." It is an instinct worthy of the most careful training; when properly disciplined, it furnishes a natural basis for both the social and the moral virtues.

7. Possibly the most characteristic secondary sex instinct is the love of approbation; at least, this adolescent trait is one of the most conspicuous. The familiar primping and posing of girls, and sudden attention

of boys to appearance and attire, together with their persistent "showing off," are among the early forms in which this social instinct is revealed. The normal adolescent is excessively anxious to please others, but especially those of the opposite sex. As Galton has expressed it, young people look upon "life as a continuous examination. All are candidates for the good opinions of others." Whether the high-school pupil is responding in the classroom, playing on an athletic team, taking part in a conversation, dancing, or merely moving about in the presence of others, all is done with an eye to the effect he is producing. This is why social pressure is so powerful in any high-school group. The pupil wishes the approval of his teacher, but he is much more solicitous concerning the judgment of his group. Were this not true, cases of high-school discipline would be very rare. The consuming desire for fame and glory has the same instinctive basis. Throughout the ages, " the sweet melody of well-earned fame" has been an all-powerful incentive in many lives. In all this, love of approval functions more vigorously than any of the later altruistic motives, such as the desire to serve mankind.

As a part of the equipment of a high-school teacher, a knowledge of the adolescent's love of approval is exceedingly desirable; it is an effective instrument in the hands of the adult who understands its use. Judgment and tact are necessary on the part of the one who would control by this motive, for fulsome flattery always proves harmful. The expressed approbation must be based on real insight. The skillful teacher continually manages to give every pupil an opportunity to win the approval of his school or his group. Of this more will be said later.

8. This discussion of adolescent instincts will close with a brief account of the latest and highest of the

social instincts, latest and highest both in the race and in the individual. Altruism is instinctively an adolescent virtue, since it buds and matures during the period of youth. The preadolescent is our true barbarian; he is effectively and charmingly selfish; all that is done for him by parents and others he takes as a matter of course; he expects even his whims to be treated seriously. But by the time the period of adolescence is well under way, there appears and develops rather slowly a new trait; the youth instinctively begins to apply the golden rule to his conduct, and he often finds much satisfaction in his acts of self-sacrifice. If the conditions favor, he may pledge himself to a life of service and bind himself by the most rigid vows. He is frequently as enthusiastic in his devotion to the welfare of others and the common good as he was a few years earlier in obtaining for himself all the pleasures and favors in sight. Every adolescent is at some time a zealous reformer; the time is out of joint, and he was born to set it right. In this thought he is happy; to him this devotion to his fellow-men seems unique.

Not only is this sublime social virtue instinctive, but it appears to have its foundation in the other social instincts. From the nature of the case, it could not possibly appear if the youth did not associate with others. If he did not enter appreciatively and sympathetically into their lives and affairs, there would be no social material with which to work; and if he were unmindful of the good opinion of others, his good intentions and his self-sacrificing efforts would many times be wasted for want of natural guidance. But the slow and uncertain way in which altruism evolves is frequently discouraging and disconcerting. Sometimes it would seem that the law of growth is an alternation between selfishness and unselfishness. Dr. Hall found that the returns of his study showed "out-

crops of the grossest selfishness and greediness side by side with a generosity and magnanimity rarely seen in adult life save in poetry and romance." [1] Perhaps we might say that adolescent selfishness, the outcroppings of which are so noticeable, is the only genuine selfishness, since the egoism of childhood is naturally unconscious and has no moral implications, and the selfishness of adult life may be viewed as a bad moral and social habit.

Thus from the adult is demanded courage, faith, and patience. In dealing with the maturing altruism of youth, one need not grow faint-hearted when there occurs a slipping back into the selfishness of the "big injun" age. One must continually feel and show faith in the final outcome of the struggle which youth is making to gain the higher spiritual levels (he tends to become what we think he is); and one can well afford to be patient with his impulsive way of doing things, his lack of intellectual perspective, and his ill-directed enthusiasm. This world, with all its old-age characteristics, is always in much need of the altruistic contributions that the youth of each generation gladly makes.

Concerning the adolescent instincts in general, it must be borne in mind by the one who hopes to be helpful through instinctive appeal, that, as Professor H. W. Nutt reminds us, "the reactions of an individual to the instinctive impulses may be either positive or negative." In the foregoing discussions, it may seem to be implied that the instincts, as well as their various manifestations, are always a positive force acting on the situation and the forming character; whereas "the struggle between the positive and negative forms of reaction to these instinctive impulses is one of the distinctive marks of adolescence, and typifies the period

[1] Hall, G. Stanley, *Adolescence*. Appleton.

as one of extreme effort to make readjustments." [1] For example, if the individual never reacts negatively to his self-assertive impulses, he naturally develops an impetuous, self-willed, headstrong character, always in danger of collision with other wills, unfit for coöperative effort, and often failing to conform to the reasonable conventions of the social and business worlds. If, on the other hand, the individual habitually reacts negatively to his self-assertive promptings, there is developed a Hamlet, whose power for energetic, decisive action evaporates, and whose personality grows colorless and uninteresting. In the disciplining of the youthful instincts, we have an ever-present and delicate problem, one demanding the tactful aid of adults and the constant application of judgment on the part of youth.

From the teacher's point of view, as Professor Hunter states it, "the whole process of educating and socializing an individual consists in determining for him, and in training him to accept, the approved stimuli for instinctive responses." [2] From the adolescent's point of view, it is more difficult to give safe and, at the same time, definite suggestions. Here individual differences are becoming more and more marked; hence general statements are dangerous. Then, too, the youth who is at all times governed by reason and carefully imbibed principles becomes introspective, loses his dash, in fact, is no longer a youth, and his impulses that might make for positive constructive character building are drained off into negative, overcautious forms of reacting. Perhaps the most wholesome advice to urge upon him is the selection of his good impulses and the allowing of these to control, rather than the constant effort to suppress and kill off the baneful impulses. This is

[1] Nutt, H. W., *Principles of Teaching High-School Pupils.* Century.
[2] Hunter, W. S., *General Psychology.* University of Chicago Press.

on the theory that a vigorous growth of desirable plants will allow no room for the noxious weeds to reach the sun and air. In order to go forward safely, it is often best that the energy released in connection with the maturing and functioning of the instincts of vigorous youth be directed toward ends very different from those indicated by the primitive instincts themselves. This is what Freud and others have called "sublimating" the instincts, or what Hall, as we have seen, characterizes as "long-circuiting" the instincts. When applied to the sex impulses, it means continually giving scope to secondary sex instincts. At any rate, all who are fortunate enough to deal with the youth of the land must constantly recognize his adolescent instincts and, as far as possible, aid in bringing them to a full fruition in a normal and constructive manner.

VI

In the foregoing account of adolescent instincts, curiosity was included. The gratification of this natural instinct depends fundamentally upon the development and use of the various sense organs. With the advent of adolescence, curiosity, as we have seen, gradually takes on a more intellectual form; it is an impulse toward more complete knowledge of a more scientific and philosophic brand. It is a curiosity concerned more and more with rational relations. This means that the senses must function in a new way. Some of the earlier writers on the subject believed that there occurs during the early years of adolescence a well-marked strengthening and refining of the organs of sense, as indicated by their more effective functioning; but this belief is not corroborated by laboratory experiments. All admit that the ardent youth begins to make a new and more discriminating use of his senses; but as James so vigorously urges, "a

pure sensation is an abstraction." With the oncoming of adolescence, there is a sense of incompleteness and imperfection which greatly stimulates, and the sensations are given intellectual and emotional settings; but the structure and functions of the sense organs as such remain unchanged. When the welling up of youthful energy stirs the blood and the grass becomes "the earth's mantle of refreshing green," and when the sky is seen as "the heaven's deep delicious blue and cloudy magnificence," there has been no change in the structure or the parts of the eye. It is now believed that the blood which has been enriched by the bountiful functioning of the endocrine glands has sensitized every nerve cell and fiber that it bathes, and that the mind is thus brought into closer touch with things of the outer world and responds more exquisitely to the beauties of nature. Physiologically speaking, the change is central not peripheral, and it includes increased power of attention and interest.

Perhaps it makes practically no difference whether the changes in the functioning of the senses is due to modified sense organs or to a new spiritual outlook, but the change itself is very significant from a pedagogical point of view. Much in the sciences and everything in art depend fundamentally upon a vigorous and accurate use of the senses; and it is a law of organic nature, long recognized, that both the physical and mental powers can be most successfully developed during the period of their natural awakening and growth, both the degree and quality of their evolution depending upon the observance of this law.

The work of training the adolescent senses must be based on a knowledge of the character of the changes that are due at this time. All those phases of education which depend upon a high degree of efficiency in the use of the senses must be timed relative to the unfold-

ing of the senses involved; otherwise there will be a waste of time and energy combined with inadequate results. Moreover, it is important to recognize at this point a well-known psychic law: namely, that the development of all the intellectual powers is intimately and causally connected with the development of all physical activities including the senses; the physical and the mental go forward together and are interdependent. For these stated and implied reasons, there follows an account of the quantitative and qualitative changes that occur in the functioning of the senses during adolescence.

1. Many writers on the subject have called attention to the appearance early in adolescence of "a new dermal consciousness." The skin becomes more sensitive and receives more attention. Both the perspiratory and sebaceous glands become more active, and the skin in consequence tends to be more glossy. There is often a new interest and pleasure in bathing and the use of cosmetics. The ancient Roman and oriental youths were excessively fond of the bath and the use of unguents. There often develops during adolescence strong likes and dislikes for contact with others. The stroking, patting, or caressing of the soft, smooth skin of another frequently furnishes a stimulus that gives much pleasure, while the indiscriminate hand-shaking common at public gatherings becomes repulsive to some adolescents. These likes and dislikes sometimes remain and become permanent idiosyncrasies. The pimples and other eruptions that frequently appear at this period are usually disturbing to the peace of mind of both boys and girls, and they sometimes resort to vigorous measures to remove the cause. It is not strange that this newly aroused interest in the sensations that come through the skin should lead to a changed feeling relative to the exposure of parts of

the body and that this changed feeling should affect the manner of dressing.

Like the modifications in the functioning of the other senses, this changed dermal consciousness is not due to changes in the nerve cells or their dendrites but, as Freud has proved, it is connected with the maturing of sex. Booker T. Washington once said that no adverse conditions were ever allowed to interfere with his daily bath, and that frequent bathing, together with a vigorous use of a towel, is helpful to both health and morals. This is the regimen recommended by Dr. Hall and other writers on adolescence. Energetic living and vigorous stimulating of the skin benefits health by aiding the elimination of waste, and they tend to forestall excessive focusing of attention upon the developing sex life.

2. The essential organs of smell are ciliated cells located in the mucus membrane of the upper nasal cavity. Experiments indicate that smell is many times more sensitive than taste, with which it is closely associated. Previous to adolescence the sense of smell does not appear greatly to affect one's state of mind. But with puberty there comes a very noticeable change relative to odors; they are now likely to be either decidedly pleasant or unpleasant. To a certain extent there is a new scent consciousness, which in the case of girls is often exquisitely developed. The redolent flowers, the newest perfumes, and the scented soaps are nicely discriminated and give much pleasure. The returns from questionnaires furnish evidence that the associations of smell, although usually subconscious, frequently have much influence in determining the adolescent's feelings toward others, resulting in strong likes and dislikes. Thus the adolescent unfoldings of this sense have a social outlook and are consequently of importance from the standpoint of personal development.

3. The essential adult organs of taste are ciliated cells found in the taste buds located on the upper side of the tongue, in the soft palate, and on the epiglottis. The taste cells are merely receiving organs, differing from the cells involved in smell, these being cell bodies of neurones. It is largely by means of experiments that we become aware of the close relation between taste and smell. Many substances become tasteless when we are prevented from getting their odor. Who would drink deodorized coffee? In general, our "tastes" are mixed affairs as to their elements. Objectively our likes and dislikes have their origin in the elementary qualities, sweet, sour, salt, and bitter, and in the associated qualities, touch, temperature, and smell; our toast must be crisp, our coffee hot, and our fruit fragrant. On the subjective side, there is a tendency during adolescence for social and supposedly hygienic considerations to influence the choice of foods; in this way we learn to enjoy more kinds of food. For this and other reasons there comes a widening of range in our dietary; and sometimes the tastes become either faddish or freakish. New kinds of food and novel combinations appeal and must be tried.

Recent studies in metabolism seem to lead to the conclusion that each tissue and cell of the body makes its own peculiar demands upon the blood supply and that our unperverted tastes sum up the results of these demands. This theory accounts for the new tastes which develop at this time. Because the relative rates of growth of the various tissues and organs vary greatly, there ensues the seemingly capricious tastes, each individual being a law unto himself in this matter. Thus it is not strange that there should be a fluctuating and unsettled period when a new equilibrium is being established. The final result of this tasting and experimenting should be a well-balanced dietary, per-

fectly suited to the needs of the individual, which is something important to future health and well-being.

It would appear that nearly all the changes incident to adolescence are attended with dangers peculiar to the nature of the changes. So it is with changing tastes. There often develops during adolescence a strong tendency to use condiments, stimulants, and narcotics. This tendency has been variously explained. The youth is naturally fond of new sensations and new mental and emotional experiences; anything that furnishes excitement is welcome. This attitude is probably caused by the increased blood pressure, the higher nervous tension, "the strong instincts to tingle and glow," rather than by the new and various cravings of the cells and tissues of the body; that is, it is probably a psychical rather than a physical demand. There can be no doubt that this youthful proclivity should be resisted. Plato has defined youth as spiritual drunkenness since there is usually sufficient mental and emotional turmoil, due to the maturing instincts; there is no legitimate demand for any artificially produced soul states of the intensive kind.

The implications of the foregoing account of adolescent tastes are clear. A well-balanced and broad range of taste for foods should be established. This taste can usually be acquired by giving intelligent heed to one's eating habits and by overcoming when possible aversions to wholesome common foods. The tastes must be trained in the interest of the higher metabolism. New eating habits are not readily formed by adults, because both the metabolic cause and the social urge, already explained, have ceased to exist.

4. The decidedly new and interesting vocal consciousness that gradually develops during adolescence has a physical basis in the various modifications which lead to a changed voice. The changing voice is due

partially to the changes in the size and shape of the air passages of the head and chest and various bone cavities; but it is due primarily to the rapidly enlarging larynx and the corresponding lengthening of the vocal chords. In boys this latter change is marked by the appearance of the Adam's apple. The effect on the voice is that it frequently drops an octave. In girls the change in pitch is sometimes very little, but a richer and more varied quality of voice is characteristic. This change in pitch and timbre of the human voice is one of the most obvious characteristics of adolescence; and it seems to correspond to the clucks, chirps, songs, cries, and other sounds of the lower animals that are so noticeable at mating times. These voice mutations begin with adolescence and are usually completed in three or four years.

While these changes of voice are taking place and the corresponding vocal consciousness is developing, there usually comes an increased interest in music, especially in all kinds of vocal feats. A new delight in rhythm and melody is often enjoyed, the interest dropping off after sixteen unless kept alive by musical training and experience. Lancaster found that over eighty per cent of the adolescents studied become interested in nearly all phases of music. At some time during this period many become enthusiastic about learning to play some kind of a musical instrument. Practically all musical careers begin at this time, although to acquire the highest degree of technique on the more difficult instruments practice should begin during preadolescence. There comes to those already skillful a new awakening; with many this enthusiasm is transient, but those who have real talent and are willing to work hard make remarkable progress. At this time the musical masterpieces of the world often have a strong appeal; for as will be explained later,

the intellectual powers necessary to comprehend the relation of their various parts are maturing and aiding the now potent emotions, the result being a high degree of appreciation and enthusiasm.

For the purposes of education, the concurrent maturing of vocal consciousness and the increased responsiveness to all the elements of music is certainly suggestive. The modern high school recognizes the great possibilities consequent upon this phase of adolescent development and provides many kinds of musical training, including music appreciation. Music is given a place in the curriculum on the ground that some musical knowledge and skill are expected of educated people and that music appreciation adds to the enjoyment of life. In general these reasons may be sufficient. But for the pupils of high-school age musical training has other and probably more important functions. Like any work of art, a piece of music tends to bring about the same soul state as that which created it. This means a much-needed and wholesome influence, one which works in two ways: (1) the emotional state which it produces is a positive tranquilizing and harmonizing influence; and (2) for those who enthusiatically participate, good music furnishes a wholesome form of emotional expression, a means of sublimating some of the powerful impulses that often prove troublesome, a way of safeguarding and enriching character.

5. Although the retina and other parts of the eye remain unchanged, there comes at adolescence an augmented interest in both form and color. The ability to judge form normally reaches its maximum at the age of fifteen, boys being naturally surer in their judgments than girls; whereas from six to ten, girls are more accurate in their judgments than boys. The various colors, which during early life seem to be purely objective, frequently take on new meanings and act

as definite emotional stimuli; certain colors are suggestive and become symbolical. During early adolescence, color is more impressive than mere form and proportion; and the youth frequently revels in his color sensations. The climax of chromatic sensibility is usually reached at about sixteen. At first gaudy colors and striking contrasts make the strongest appeal; later there develops a taste for delicate tints and subdued tones. Sometimes there occurs a strange reversal of feeling toward certain colors: a color like purple, much admired during childhood, loses its power to please; and certain shades of green, once of little interest or perhaps displeasing, come to have great charm. This awakened interest in form and color is especially noticeable in relation to dress and art. Thus there appears both a social and an esthetic appeal.

There comes, too, in the later years of adolescence an increased sensitiveness to proportion and symmetry. Things in nature and art are perceived in larger units, and more interest is felt in mere relations. There appears at this time a questioning as to the fitness of things and a growing power to appreciate and apply the higher principles of art. In outdoor nature, the lakes, rivers, fields, hills, and trees which once had principally a utilitarian appeal now cause a delight resembling the enthusiasm of the poets. On the social side, there comes increased ability to note and appreciate the finer differences in the form and expression of human faces, the manner of walking, and other personal traits. This new power of perception doubtless comes largely through the new social interests, which in turn are based upon the developing social instincts.

This enriching of the sensory life through the increased power of vision, as all studies show, is due not only to instinctive and social developments already

noted, but also to the maturing of powers of a more purely intellectual nature. The studies of Griffing show that the greatest number of letters that can be recognized at one time increases rapidly from puberty to maturity. The ability to make visual judgments improves, and there comes to be a much closer relation between the mental and the retinal sensations.

In general, there is an augmented elaboration on the intellectual side of all the incoming sensations. During early years, sensations tend toward reactions that are more purely reflex in nature; whereas the tendency during adolescence is toward delayed and better coördinated responses to stimuli. The materials supplied by the various sense organs, when they reach the brain, apparently are worked over and sometimes greatly elaborated before the finished product is sent back in the form of fitting action. The evident growth in the associative powers of the mind (which will be considered later) leads to many new ways in which the mind functions in connection with the use of the senses; on the whole, there is naturally more deliberation and thinking, what is technically called "increased cerebral irradiation." All this increased elaboration of the incoming sensations, in turn, reacts upon the corresponding sense organs and causes them to do their work more perfectly; it seems to be a case of what is so common in nature—a progressive interchange of functioning between cause and effect. It is even maintained that there are built into the sensorium new discriminating powers; about 14,000 is the number of sensations distinguishable according to Külpe. Moreover, there seems to be an increased ability to evaluate the psychic importance of the various sensations pouring in from the environment; this, combined with the novel sensations coming from the various parts and organs of the body, constitutes a

truly reconstructive period in all that pertains to the senses.

In the writings of Dr. G. Stanley Hall, whom it is now the fashion to discredit, we find, perhaps, the most emphatic statements relative to the practical aspects of the subject under discussion. In connection with his account of the more important general features of adolescent sense development, he stresses the significance of the youthful alertness and responsiveness of the senses. Every ingoing nerve fiber "glows and tingles with new life" and "is freighted and even gorged with the traffic of impressions." At no other time does the external world press so imperiously upon the individual; at no other time does it seem so overpoweringly real and inescapable. There is the closest intellectual harmony and emotional sympathy with all that the senses reveal. According to the new psychology, "emotional enrichments are quite probably largely determined by mere glandular attainments and resultant autonomic activities." Whatever the explanation, now is a good time to learn the world and gain experience. "The eye gate and the ear gate especially are open widest." The pedagogical suggestiveness of all this is clear and impressive.

Hall also warns us concerning the dangers incident to this dominance of the senses. When the senses are so insistent and so absorbing, life is "prone to become sensual if uncontrolled." These active powers are easily perverted and youth readily slips into a life of indulgence.

All that we know concerning adolescent sense development, thus urgently bespeaks a vigorous training of these powers. Ever since the days of John Locke the human senses and the percepts resting thereon have been held to be fundamental, and the importance of well-functioning senses has not been questioned.

"Experience," based on the use of the senses is a continually recurring idea in educational discussions. The power to know and discriminate everything in one's environment rests fundamentally upon a vigorous and skillful use of the senses. To develop effectively the senses and at the same time safeguard them against the dangers of perversion, we apply a well-known biological law: namely, the growth and development of any organ or faculty are conditioned by its legitimate and vigorous exercise.

In the next chapter, it will frequently appear how the functioning of the senses and the resulting coordinations are connected with teaching problems in the secondary schools.

VII

Sense development is closely related to the adolescent's attitude toward outdoor nature. During childhood and preadolescence, the aspects of nature are ingenuously learned and accepted on a purely practical basis. Interest in natural laws is very limited. Interpretation of nature is superficial and extremely utilitarian. But the feelings of youth toward nature are more generous. The sounds, forms, and colors in nature take on new meanings. Often for a time the youth views nature after the manner of the poets; he "holds communion with her visible forms," and to him "she speaks a various language." The breezes are more than winds; Aldrich's lines come to have a meaning and an appeal:

In youth, beside the lonely sea,
Voices and visions came to me;
In every wind I felt the stir
Of some celestial messenger.

This emotional response to nature is one of the symptoms of a poetical awakening, which, in its various

phases, is much more common than is generally realized; the youth is often shy about such matters; he is instinctively sensitive concerning the opinions of others, and he does not wish to be considered sentimental; hence, he does not speak the language of his heart.

The psychology of this aspect of adolescence seems to be somewhat as follows: the senses are alert and tingling, their messages are vivid and imperative, there is a new vigor and a surer sense of discrimination, and the evolving instincts and impulses give rise to a new emotional life. Thus the youth has this double stream pouring in upon him. The senses are flooding him with sounds, odors, and pictures from the external world; and there are confused masses of sensations and impressions, all new and strange in their effects, having their origin in maturing organs and glands and entering the sensory parts of the brain. Out of this aggregate of instincts, sensations, and emotions appears to come the tendency to *project* the sensations. The new psychic state must find an explanation; so nature becomes vocal and in other ways communicative. She takes on the temporary moods and feelings of her youthful admirer; "for his gayer hours she has a voice of gladness," "and she glides into his darker musings with a mild and healing sympathy." With this objectification of the sensations there come strange possibilities for enjoyment and inexperienced moods of brooding and depression. These sentiments and moods which nature assumes are usually indistinct and ill-defined, vague and diffused raptures alternating with times of misgivings and unrest. These constitute some of the most unique characteristics of adolescence; and they are best understood and interpreted as secondary sex traits. They are physical in origin, and unfortunately disappear in most cases with the passing of adolescence.

The pedagogy involved in this phase of adolescence will be discussed in later chapters.

Another attitude toward nature is exemplified in the adolescent's interest in the sciences; this new interest, according to Hall, genetically follows the sentimental or poetic response. The larger aspects of the natural sciences first attract. An analytic treatment does not appeal, for classifications and formulas are without educational content. At this time, the objects and materials of science are best studied in their natural setting and as having contact with the life of the pupil. The spirit of botany is discovered in the fields where the flowers grow, rather than in the laboratory. The nature of youth suggests a natural and humanistic, as opposed to a logical, approach to all the sciences; the biographies of the men that have done constructive work in the various fields of the biological and physical sciences support this view of the matter; they were "first passionate lovers of nature in their chosen fields." As in the realm of art, the initial impulse in nearly all cases awakens the great scientist during his years of adolescence.

Following the comprehensive concern for the things of science usually comes an interest in the utilitarian and economic aspects of the subject. The practical applications of science to the affairs of life make their appeal to the high-school pupil toward the end of his course. He finds inspiration in the possibility of making nature work for him. He is soon to be a breadwinner, and he is pleased to discover an ally. If the adolescent is fortunate enough to continue his studies, he may find great satisfaction in pursuing science for its own sake, but high-school pupils in general need other motives than the mere love of truth.

If this account of the adolescent's feelings toward nature is at all accurate, it is apparent that his attitude

varies greatly. First it is naïve and selfish, next poetical and sentimental, then mildly scientific and curious, then once more practical, and, perhaps, in the end strictly scientific. This statement must be interpreted very generally; the sequence here indicated is not rigid, and individual variation is as manifest here as elsewhere.

VIII

When we pass to a consideration of the more purely intellectual characteristics, we must not overlook, in dealing with individual cases, the influence that practice and training exert; and these of necessity enter into all the averages, no matter how large or typical the group under consideration. The possible modifying effect of practice and training should always be present in the mind of the reader in connection with all the topics discussed in this section.

1. The various kinds of memory (it is not good form to discuss memory as an abstraction), like all phases of adolescence, have a physical basis. James has argued convincingly that our memories, as well as other mental powers and traits, depend fundamentally upon the quality of nerve tissue that we have inherited; and other writers later have persuaded us that the education of our memories and other powers is predominantly "a process of producing, directing, or preventing changes in the neurone connections which control and determine mental traits." [1] From this it would appear that the gradual increase in memory efficiency during adolescence, shown in the tables published by G. M. Whipple and others, is the result of progressive changes in the neurone connections. Should this interpretation affect our educational procedure?

The measurements of memory efficiency during ado-

[1] James, William, *Psychology*. Holt.

lescence indicate, in general, a very slow advance in the case of both boys and girls; and the tables show that there is a strange falling off in efficiency of nearly every kind of memory between the ages of fourteen and fifteen. From all the reliable evidence thus far published, the only conclusion warranted is that memory is not an "adolescent faculty."

The tables on which these statements are based include the memory span for digits, concrete and abstract words, related and unrelated words, and memory ideas; and these different memories vary from year to year as to rate of improvement. It is believed that visual is better than auditory memory during this period. Observations in the schoolroom justify the statement that the adolescent shows more ability in learning his lessons if exact verbal reproduction is not required; this is doubtless accounted for by his increased power of thought. There is manifest in connection with memory at this time an increased selective power; the pupils hold in mind best the facts and experiences that are most likely to be of service to them; that is, memory is not merely an end in itself.

In at least two particulars, memory at this time is less efficient than it is either earlier or later. Because the adolescent experiences are so interesting and intense, memory relative to circumstances that occurred very early in life is not good; and because of the intense and broader subjective life of adolescence, temporary memory concerning practical affairs that seem of small importance is less reliable. The differences here noted are probably not so much differences in the various memories, as such, as they are in other mental powers which function in connection with memory.

2. Judging from observation and the results of studies that have been made on the subject, there can be no doubt that imagination plays a very large and signif-

icant part in the lives of many adolescents. As already indicated, the migratory instinct is at times strong and compelling. In connection with mere wanderlust, there is a new interest in the world lying beyond the limits of the world revealed through the senses. Images of what is happening or may happen in distant places flood the mind of youth; and, "as imagination bodies forth the forms of things unknown," things immediately communicated through the senses are rendered either stale or obscure. School with its wearisome routine and the same combination of people monotonously appearing day after day sometimes becomes almost unbearable, because of glorious and highly-colored imagery vigorously claiming attention. Thus instinct and imagination unite in some cases to accomplish the youth's educational undoing.

Psychologists have for many years indulged in lengthy discussions concerning the physical basis of imagination. The discussions center around the way in which sensations and images resemble and differ. When the youth sees so vividly in his "mind's eye" the distant landscape or city filled with strange and interesting experiences and people, whose meaning and values are somewhat vaguely identified with his happiness and well-being, just what is taking place in the brain and other parts of the nervous system? What is the underlying neurone activity that gives rise to image formation? James and many later writers assure us that "the subjective difference between imaged and felt objects is less absolute" than is generally supposed. Of course a sensation and an image differ in their origin; the one is peripheral and the other central. But it is not now generally believed that the brain activity which results from an incoming sense stimulus originating in some external object differs in kind from the brain activity that accompanies the

mental picture of the same object. James believed that the two processes probably differ in quality and intensity. But in the case of the adolescent, which shall we say is the more intense, and which has the more alluring quality? Contrary to general adult experience, it often appears that youthful images, although less stable, are more intense and more impelling in their effects. Like other mental phenomena, the matter is so complex that a complete statement is impossible; but in the case of adolescent imagery especially, it is probably the associated neural activity that gets mixed up with the image-producing activities and imparts to them their characteristic force and personal value.

Studies beginning with Galton and coming down to the present tend to show that auditory and visual images are the most prevalent and interesting; however, the adolescent boy images vividly enough the odor of the fishing stream and the organic sensations associated with the bathing beach, and he mentally tastes the wild fruit found in his rambles abroad. Perhaps this suggests the difference between adult and adolescent imagination; the latter is broader in scope, as well as more compelling in consequences. In other words, the imagination of youth functions in ways that closely resemble the imaginative workings of the reformer, the man of vision, and the idealist. In both cases the world of the senses appears to break down and in a measure to lose its appeal, and the world of the imagination supplies consolation and inspiration. The motive of action with the adolescent, as with the man of principle and vision, is some worth-while and vigorously imaged ideal, perhaps distant in time and space, the only important difference being the moral elements included in the motivation of the reformer.

Dr. Slaughter speaks of the "rebirth of the imagination." The manifestations of the imagination during

certain years of adolescence are so unlike the playful imagery of childhood that "rebirth" does not seem to apply to the case. During preadolescence the imagination tends toward the constructive and practical, like the other mental activities of the period, whereas during the years of adolescence the imagination tends to become creative and idealistic. The constructive imagination of the preadolescent is sometimes more useful, while the creative imagination of the adolescent is much more effective in the formation of character. During the earlier period, the imagination pictures things as nearly as possible just as they are, whereas the youth builds pictures of things as he wishes them to be and with himself as the center of action; that is, his imagination deals much in possibilities. The pictures which generally portray social situations are usually done in high lights and with more roseate hues than apply to similar circumstances in actual life. Reality and the realm of the imagination are sometimes as discreet as possible. The only limitations manifest on the "airy nothings" are those imposed by the individual's lack of knowledge and experience; the one whose daily life is the most commonplace often indulges in the most gorgeous and exciting daydreams. Unfortunately the effect of contrast naturally is to make the everyday actualities seem drab and tame, hence another cause of unrest and discontent. From all this it appears that the imagination plays a part in the life of the adolescent different from what it has done at any earlier period.

Again, adolescent imagination is unlike that of earlier years in the fact that, like the memory, it is more selective and shows more power of organization. Individual tastes and ideals enter more definitely into the arrangement of the materials, and the combinations that make up the picture evidence more power of

thought and are less riotous than the fancies of childhood. In other words, this is another example of the greater degree of coördination among the various mental powers.

It must not be understood that the imagination is now entirely void of the practical. There is often a strong impulse toward the realization in some practical way of the worthy promptings of the imagination. This is much more likely to happen when the social setting favors; as for example, the boy who has frequently pictured himself as highly successful in some athletic event is almost sure "to try for the team" when the athletic spirit of the school is strong. The same effect of social influence on the practical workings of the youthful imagination is evident in connection with music, dramatics, debating, public speaking, and social achievements in general. The stimulus is not so much in the pictured success itself as in the imagined appreciation and admiration of the other members of the social group.

The effect of trying to realize one's ideals is most wholesome. Unless the will is brought into play and the better impulses translated into fitting and vigorous action, daydreaming, with its enervating effect, tends to result in sentimentalism and other weak traits of character. The best antidotes for an overworked imagination are the democratic associations and free competitions of the modern public high school; here there is always at hand a court of last appeal in which the creatures of the youthful imagination are given ample opportunity to prove their fitness to enter the world of everyday realities. Actual experience stabilizes and tends to make practical the functioning of the overactive imagination.

What part has the teacher in all this? In dealing with processes so changing and evanescent as the

youthful imagination, should we expect the adult, who is not generally felt to be *en rapport* with adolescent visions and ideals, to exercise a great amount of influence? "That the inertia of the older people is wisdom, and not impotence, is a theory," R. S. Bourne asserts, "that you will never induce youth to believe for an instant." [1] When Bourne said this, the spirit of youth was upon him. R. H. Davis, who has long been a student of the high-school age and the problems involved, has discovered, in the happy and knowing smile of youth, the fact that "you and the world in general were not impressing him as seriously as you thought you were." It is wisdom on our part always to assume that his world is not our world; the situation thus viewed seems unfruitful and discouraging; but we have not thus far exhausted the psychology of the matter in hand.

Like teaching morals, influencing the adolescent through his imagination calls for other than direct and specific treatment. Those who best understand and appreciate have always discovered indirect and subtle ways of "firing the imagination" of youth. As Professor Dewey reminds us, "There always exists a goodly store of non-functioning impulses which may be drawn upon." [2] Appeals to the instincts, as we have seen, are fundamental and compelling; youth is naturally generous and worthy impulses are many; from these sources may come influences that will stir the imagination. Because of the uniqueness of this phase of human nature, no one can say what will inflame the imagination at this time: a noble piece of literature with an imaginative appeal, a worthy cause concretely presented, some great and fundamental concept of science with thrilling possibilities, the

[1] Bourne, R. S., *Youth and Life*. Houghton Mifflin.
[2] Dewey, John, *How We Think*. Heath.

world's social and moral progress in well-written history showing how "the old order changeth, yielding place to new," some character that has expressed itself in epoch-making action, a close and worthy friendship—any of these, or their like, may serve as the enkindling spark. Sometimes the adult's part is to see that the youthful visions find fitting action and are not dissipated as mere daydreams; at all events, serious treatment should be accorded, for in the Utopias of these days are to be found the essential materials of individual and human advancement.

IX

In the second section of this chapter, there is a brief description of the changes that take place in the tissues of the adolescent brain. This development of latent brain cells and the extension of the fiber processes into new areas might be expected to serve as a physical basis for a rapidly widening range of thought, and many who have guided the thinking of high-school pupils have noted very encouraging progress in both the ability to reason and the type of thinking that appears. To some there seems to be a parallel between physical evolution and thought development, suggestive of a causal relation. If such is the case, this is a fitting time to perfect as many neurone connections as possible.

It is not to be implied from these statements that there appears an entirely new form of mental activity or that there is a startlingly sudden ripening of the power to reason. The instinctive reactions and the corresponding emotional responses, together with the social developments, are sufficiently marked and characteristic to cause many writers to use the term "new birth" when describing adolescence; but the power of thought is a plant of long and relatively slow growth. As Professor Dewey says, "There is such a

difference in the materials with which the thinking is done, and the ends for the sake of which it is carried on, that the impression is easily created that the thinking itself is of a radically different kind."[1] Carefully conducted investigations by G. F. Bonser and others seem to establish the fact that children in solving their problems both in and out of school use the same *general* thinking processes as adolescents and adults. The theory of saltatory growth has for some time been displaced by the theory of gradual development; and so far as concerns the maturing of the thought processes, which we are now considering, as shown by experimentation, there is no ground for doubt.

Then, too, when we study the thinking process, it is important that we should not lose sight of the influence of experience and education. Since general experience is normally increasing rather rapidly, because of the new social outlook, and since all worthy educational efforts aim at a certain definiteness, the individual of high-school age is, as Thorndike suggests, forced to know more relationships between things, just as he is to know more things. In other words, when we study the relative efficiency of the thinking process, we must take into account the amount and kind of training and the nature of the material with which the mind has been occupied.

From this are we to conclude that there is nothing specific or different to be said in our description of adolescent thinking? When we pass from the realms of the instincts, sensations, sentiments, and imagination to the field of thought, individual variation and changes are still included in the laws of adolescent development. During the years of preadolescence, the boy or girl thinks largely in a representative and more or less concrete way; whereas the youth, with his enlarged

[1] *Ibid.*

horizon and his "susceptibility to larger concerns and issues," finds "opportunity" as Dewey expresses it, "for thinking of a more comprehensive and abstract type than has previously obtained."[1] During the preceding period, to know things and persons and to be able vividly to hold them in mind were entirely satisfactory; but the adolescent attempts to think out the how and the why of the phenomena that come under his observation, to get behind the scenes and understand how the universe is run. The knowledge previously obtained of things and especially of persons is now generalized; and as we have seen in connection with the adolescent's attitude toward nature, the process of generalization proceeds until general truths that are believed to be either practical or scientific are reached. This necessarily involves the grasping of more and more minute and comprehensive relationships. Abstractions relative to the practical aspects of phenomena usually precede those of a more purely scientific nature. Practical generalizations now appeal, because the youth regards himself as a doer of deeds, one who must be reckoned with; and he shows much interest in general rules and principles that apply to the materials and the processes by which he happens to be surrounded. In the days of his childhood, the various processes must be dramatically represented; during preadolescence, things and processes must be personally useful; in adolescence, to satisfy fully, they must be scientifically or socially serviceable. Hence the youth best reaches pure science, if he reaches it at all, through its practical application to art or industry.

To sum up these statements concerning adolescent thinking: the brain developments at this time seem to warrant our expecting an increased interest in the larger and broader things and affairs, and with this

[1] *Ibid.*

interest we should naturally expect a rapid increase in the ability to appreciate general ideas and meanings and a tendency to search for ways of controlling unfamiliar and perplexing situations; and those who have followed closely the thinking processes of high-school pupils through four years have not been disappointed. It is for sound psychological reasons that the subjects which deal with fundamental principles and lead to general laws, thus requiring more abstract reasoning, are placed in the third and fourth years of our curricula.

X

What are some of the educational implications of the foregoing account of the adolescent intellect?

Although it is generally understood that secondary education, as compared with elementary, is concerned more immediately with the mental traits, one cannot escape the conclusion that the methods, as well as the materials used, must be such as to appeal to the whole nature of youth. He is to be dealt with as a being having numerous strong, developing instincts. The methods will, as far as possible, reach the mind through the senses. Memory will seldom be treated as an isolated faculty, but will be called upon to function in connection with the senses, the imagination, and the thought processes. The imagination often furnishes the surest and safest means of approaching the various intellectual problems; it gives the things of the memory their setting, and it frequently blazes the path for reason. It has been implied that reason is usually preceded by curiosity and will function most vigorously and persistently when led on by this instinctive lure. The methods used will lead to a frequent alternating of thought and emotion; this gives significance and value to adolescent thinking, without which the thinking is lacking in educational content and might as

well not be done. In brief, the pupil is always to be treated as a *unit* by a constant appeal to all his powers; but the teacher who has been thoroughly trained in the prevailing methods of adult psychology is not likely to do this very thing, because psychology, like any other science, tends to produce an analyzing habit of mind which naturally deals with parts instead of wholes. However, the adolescent must be treated as a whole if the treatment is to be wholesome. Neither the born teacher nor the man who is successful in his relations with his fellow beings needs to be told this.

Not only is the individual to be dealt with as a whole, but the knowledge presented, in order to make its strongest appeal, must be set forth as unified wholes. The methods used must group the facts either as supporting general principles or as correlated in some useful mechanism or institution; isolated facts at this age are losing their interest. Moreover, the process of organizing knowledge should often be in the foreground, both on the part of the teacher and the ones taught. Now is the time to gain the *power* to organize knowledge rather than to gain a vast amount of organized knowledge. Reason is now in the theoretical and critical stage in its development, and with this comes the craving to explore, investigate, and question on a larger scale. Both materials and methods should give scope to the desire to test ideas and people and things in general. As Professor Parker observed, "Adolescence commonly brings with it larger social interests and larger economic responsibilities, which provide opportunities for thinking about many larger problems than those which presented themselves during the years from six to fourteen." [1] This is the situation on the mental side.

With these rapidly expanding intellectual, social,

[1] Parker, S. C., *Methods of Teaching in High Schools.* Ginn.

and economic interests and the corresponding development of the mental powers, of necessity there comes in many cases a lack of intellectual perspective. We are not to be disappointed or impatient if the high-school pupil whose mind is moving so vigorously in new fields fails to see all things in their due proportion and to evaluate according to adult standards. Any treatment that corrects this mental crudeness and lack of intellectual poise at the expense of youthful enthusiasm and independence is faulty at a very vital point. Adolescent psychology demands that the method be suggestive rather than rigidly logical and arbitrary; we may well say, "Come, let us reason together."

The adolescent's ability to think often outruns his power to express himself, and the method employed must not ignore this disturbing disparity. While clearness and definiteness are intellectual virtues to be sought, extreme precision and complete logical consistency at every point must not be expected. Sometimes the adolescent feels that his thoughts are too great for utterance and that in consequence he is often misunderstood; sympathetic treatment is needed at this juncture.

These in general are a few pedagogical conclusions that seem to follow from the nature and development of adolescent intelligence. All the succeeding chapters are attempts to apply our knowledge of adolescent characteristics to the specific problems of the classroom. The success of these efforts and the degree of helpfulness resulting will depend of course upon (1) the accuracy of our knowledge of the youthful mind and (2) our skill in the application of this knowledge to the teaching process.

The foregoing account of adolescence is of necessity general in its nature; and the following discussions, while they deal with specific problems and rather well-

defined subject matter, must always leave room for individual judgment on the part of the teacher. It cannot be otherwise. The same is true in the practice of every art. However, one cannot well escape the conclusion of Professor Inglis: "The greater our knowledge of mental traits and the nature of their development, the more intelligently and efficiently can the process of education be conducted"; and, although our knowledge of these traits is neither adequate nor reliable, there are "certain general tendencies which it is our duty to recognize." [1] This is the most natural and hence the surest way to secure enthusiastic and hard work from our pupils.

[1] *Op. cit.*

CHAPTER III

GENERAL CLASSROOM PROCEDURE

I

The purpose of this chapter is to set forth and discuss certain principles and practices that apply to the teaching of any academic subject found in our high schools. Although this is a book primarily concerned with special high-school methods, the general treatment here attempted is used in the interest of economy. An effort will be made here, as in all the succeeding chapters, to deduce the principles underlying classroom methods and technique from our knowledge of psychology in general and adolescent psychology in particular. Again, in the interest of economy, it is not thought necessary in every instance to explain in full how the principles and practices advocated rest upon psychological considerations; however, a serious attempt will be made to limit the discussions in this chapter to such classroom procedure as finds sufficient warrant in adolescent nature as described in the preceding chapter.

The same may be said concerning the high-school program of studies, in so far as this is considered. It is assumed throughout that, for the high-school pupil, that knowledge is of most worth which stands in closest relation to the natural emotional and mental activities of adolescent boys and girls. We are not to build up men and women by imparting to our boys and girls knowledge carefully chosen from the trades and professions found in the fields of the pupils' supposed future

activities and imparted by methods paralleling those found in the shops and countingrooms, a theory of education much in vogue in certain quarters. The controlling hypothesis is, rather, that education is a process of maturing and setting free human character in the highest form of which the individual is capable; education is not something superimposed layer upon layer, semester after semester. As Browning has expressed it,

> *to know,*
> *Rather consists in opening out a way*
> *Whence the imprisoned splendor may escape,*
> *Than in effecting entry for a light*
> *Supposed to be without.*

It is true that no one in these days thinks of the process of education as going on in a vacuum, uninfluenced by the materials and methods found in the pupil's environment; all organisms draw sustenance from the medium in which they exist. Thus it is natural and profitable that educational practice should be influenced by the social order of the present day, but this influence must be so managed that the result will always be the social order as seen through the medium of individual natures. The schools are to seize upon the improved materials and methods found in such abundance in the social and industrial orders and use them as aids in setting free "the imprisoned splendor" of character and personality. All this presupposes, to use Thorndike's phrasing, "an awareness of what individual human natures really are and really want";[1] that is, we must recognize Browning's imprisoned splendor in order to set it free.

Unless prospective high-school teachers and teachers of little experience are aware of the relation between any proposed high-school procedure and adolescent

[1] Thorndike, E. L., *Individuality.* Houghton Mifflin.

nature, there is likely to be a sense of insecurity and a consequent lack of that confidence which is needed in dealing with the American youth. Moreover, the young teacher cannot safely leave everything to be settled by experience; nor is it wholesome that his pedagogy should be of the dogmatic type.

The scope of this chapter makes impossible either a complete or an exhaustive treatment of the topics usually considered under general method.

II

When we attempt to base classroom practice in the high school upon the nature of the adolescent, we appear to be confronted with two opposing principles.

As we have noted in the preceding chapter, because of the maximum functioning of the social instincts, adolescents desire very much to be identified with some group and to be one in spirit with the members of the group. This identification with the group and the sense of unity which accompanies it serve as strong stimuli, frequently urging the individual towards a supreme effort, because he has become more than a mere individual; he is naturally inspired by the ambitions and enthusiasms of his group, and he feels that he must exert himself to aid in the realization of its common purposes. This is the advantage that comes from *esprit de corps*. When found in the classroom, this oneness of spirit is called "class unity"; it means that teacher and pupils are completely united in thinking the same thoughts and experiencing the same emotions. Without this psychic unity, the conventional classroom arrangement can hardly be justified. Without class unity, the recitation resolves itself into a series of dialogues between the teacher and one pupil after another, with the unoccupied members of the class mentally loafing and often shamefully bored. In a

large class, the result is an egregious waste of time and energy; and worse than the waste involved, the conditions are favorable for the formation of many bad personal and school habits. The strong natural desire of boys and girls of high-school age to merge their efforts for a common cause makes it imperative that there should be continuous coöperation on the part of all members of the class, and the powerful social urge of this age should make it reasonably easy to obtain this class unity.

If we focus again on the nature of the adolescent, seemingly opposed to the unifying tendencies, we discover (1) marked individual differences and (2) a growing independence in both thought and action. Everybody knows that even at birth children differ greatly as to both physical and mental characteristics and possibilities; but it does not appear to be so generally known that these differences become more marked, and, hence, for purposes of education, more significant during adolescence. This individual variation, as shown by many careful studies, is due to many specific influences. As illustrative of the influences which determine the traits and tendencies of the individual adolescent the following are mentioned: (1) sex, which is nearly always powerful at this time in affecting social characteristics, causes the average adolescent boy to differ somewhat from the average girl of the same age; (2) the characteristics of the remote ancestry or race, which frequently make their appearance in ways most striking in the individual adolescent; (3) the intellectual traits of near ancestors, which generally begin to function more vigorously than ever before during the teens. These basic influences of sex, race, and near ancestry furnish the starting point for everything that may be classed as educational environment; hence it often happens that

the education of the adolescent increases the initial differences and thus makes increasing demands on the teacher's skill in maintaining class unity.

As just indicated, these growing individual differences take the form in nearly all cases of increasing independence in both thought and action. As was shown in the preceding chapter, the structural elaborations in the hemispheres of the brain at puberty furnish the physical basis for broader and stronger thinking; and the consciousness of this increased power naturally results in added confidence and enthusiasm on the part of youth. This suggests one of the differences between teaching on the elementary and the secondary levels; this growing independence and the appearance of a more theoretical and critical type of thinking on the part of high-school pupils, this "inward strife for truth and liberty," is wonderfully stimulating in the classroom. But it does not, except in the hands of a skillful teacher, make for class unity.

These are the opposing principles referred to that appear to come from our attempt to base classroom procedure upon the nature of adolescence: on the one hand, a strong and instinctive desire for *esprit de corps*, a natural social tendency toward group unity in thought and feeling; and on the other hand, individual differences becoming greater and more significant because of sex, race, ancestry, education, and increased power to do independent thinking. How are these opposing principles to be harmonized, and how are these pedagogical purposes to be realized?

As in the case of nearly all classroom problems, it is the teacher who must, through his sympathetic knowledge of youth, recognize the conflicting tendencies and combine the forces in such a way that the purposes of the lesson in hand will be realized; the mind of the teacher is the flux that must fuse the individual efforts

of the pupils into a unity of endeavor to grasp and solve the lesson difficulties as they arise. This doctrine of class unity has been given a very unique and general statement by the German mathematician, Felix Klein. "If I were to formulate the great problem of pedagogy mathematically, I should say that it consists in marshalling the individual qualities and capacities of the teacher and his students as so many known variables and in seeking the maximum value for a function of $(l+n)$ variables, under given collateral conditions." In this mathematical formula, n represents the number of pupils in the class and l represents the teacher. "If this problem, as a result of the advances made by psychology, should some day admit of direct mathematical solution, then from that day onward practical pedagogy would have become a science. Until then it must remain an art."

To change the figure, the skill in this art which enables the teacher to combine the forces and secure the desired resultant grows out of insight and resourcefulness. Insight includes ability in discerning each pupil's nature and quickness in supplying his needs during the recitation period. Resourcefulness implies much ready material pertaining to the matter under consideration and much judgment as to when and how to use this material. Insight and resourcefulness denote something much deeper and more important than mere external and mechanical technique, which can be acquired through imitation and instruction and made habitual by practice. As we read in the survey of the Missouri normal schools, these "are the fine and less obvious factors in good form; and they differ from the [external] elements of skill in that they depend upon intelligent adaptation rather than upon habitual processes." They mean not only an understanding of "the capacities and the interests of adolescents, but

also readiness in summoning resources, initiative in adapting them to rapidly changing situations, and a kind of *rapport* with one's class that strikes very much deeper than a mere understanding of its capacities and limitations." All this implies, of course, that the teacher must have so mastered the materials used that he feels free to focus on the thought processes and emotional responses of his pupils; for, according to this standard, everything pertaining to both method and material is determined by its relation to the immediate interests and needs of the pupils.

It must needs also hold that, if true insight and abundant resources are to control the teaching process, the movement of the recitation cannot be impeded or diverted by any lack of skill in external matters, such as stupidly repeating answers, concert responses, monopoly by aggressive pupils, unsystematic methods of handling routine matters, indistinct habits of speech, or illegibility of handwriting, naming the pupil before assigning the topic for discussion, and like faulty classroom management. These mechanical defects easily creep in and become habitual. Besides interfering with the workings of the more important and finer skills in the art of teaching, mannerisms and faulty habits are likely to bore the pupils. This the normal adolescent will not long endure without some form of protest.

In the following chapters will be found suggestions and discussions as to how independent thinking is to be fostered and class unity maintained, notwithstanding increasing individual variation characteristic of adolescence, in other words, how insight and resourcefulness may function in ministering to the needs of high-school pupils by presenting the subject matter found in our program of studies.

The strong social proclivities of adolescents naturally aid in establishing and maintaining class unity and

furnish the basis for class responsibility. When present, this group responsibility is a sure sign of skillful and effective teaching. When the class as a whole evinces a sense of responsibility for the success of the class exercise, the educational welfare of each member of the class is ensured, and the growing desire for independence in thought and opinion is likely to find satisfaction. This socialized sense of responsibility is really a form of loyalty, and loyalty is a motive that has for the normal adolescent a powerful appeal. When the members of the class unite in feeling that it is only through their efforts that the higher purposes of the recitation can be attained, each member naturally wishes loyally to serve by contributing to these purposes; thus are gratified both the desire for independence and the instincts which rejoice in united social effort. In this form of social activity the conditions are present for developing a desirable degree of freedom, always to be exercised under the natural restraints of social laws which are readily recognized and understood. Thus again we harmonize the apparent opposition between the adolescent's longing for social unity and his growing power and desire for independence.

The reader doubtless believes that the foregoing is sound pedagogy, based on adolescent psychology; it may all seem, however, too general and theoretical for everyday classroom use. What means may the teacher employ to develop this sense of group responsibility for the success of the lesson?

Much of this feeling of class responsibility is brought about by the skillful teacher in ways that are too subtle for description; it is the cumulative result of continuous and conscious effort of a teacher with real insight. However, from the standpoint of method, there are a few rather definite forms of activity on the part of the members of the class that should be encouraged. (1) Be-

cause of their sympathetic attitude toward members of their group, high-school pupils are naturally skillful in diagnosing the difficulties of their classmates; and this they are pleased to do, since it appeals to their instinctive desire to be helpful and to a resulting sense of superiority. (2) It is usually not difficult to develop in a high-school class a wholesome critical attitude towards the performances of any member. This acts as a wonderful intellectual stimulus for the one reciting, and it tends to attract close attention from all the others, thus establishing one phase of class unity. (3) The critical attitude just referred to must be in a spirit sufficiently broad to include appreciation and approval of successful efforts of any member of the class; this discriminating evaluation of the work of one member of the class by another is encouraged and fostered by the manner in which the teacher receives it. (4) A sense of responsibility is shown by bountiful contributions of apt illustrations of the point under consideration and of suggestions as to how the knowledge presented may find practical application to the affairs of life. (5) All voluntary contributions germane to the purpose of the lesson are evidences of group responsibility and should be hospitably received. The importance of this matter under consideration will be conceded. When the spirit here indicated is present, it ensures a large degree of self-activity; and because of the strong social appeal, it should give much pleasure to all who participate.

III

The psychology of preadolescence, supported by many experiments in elementary education, clearly justifies the use of methods that are somewhat authoritative and dogmatic in dealing with pupils from eight to twelve years of age; we are warranted in spending

much time in drilling and inculcating the things that will be needed by pupils of the elementary schools. But, as the pupil passes into adolescence, we must introduce more and more material that will give scope to his increasing power for independent thinking. From the standpoint of the teacher's preparation for his class work, nothing will take the place of a careful, logical organization in the teacher's mind of the material which he expects to use in realizing his aim. If the teacher is skillful and sensitive to the needs of his pupils, he will very often substitute a psychological organization of his lesson material for his mature logical arrangement; this he will do because of his pupils' lack of mental maturity and because of their incomplete knowledge. The teacher's mastery of the intellectual content of the lesson appears clearly in the organization of the subject matter; this makes a natural appeal to the increasing powers of the adolescent mind. A logical organization subordinates accessory, contributory, and illustrative materials to the essential and fundamental matters which lead directly to the objective of the lesson. A psychological organization, on the other hand, takes into account the experience and degree of maturity of the learner and arranges the lesson materials with a view to leading his thinking from its natural inductive mode to an appreciation of a more mature and logical arrangement of the lesson content. A discriminating preparation on the part of the teacher always affects his presentation, it establishes an intellectual attitude which naturally requires a reasoned support of each point presented, it fosters a sense of proportion that ensures emphasis of salient points, and this dominance of the intellectual in the matter of method makes a strong appeal to the developing critical powers of high-school pupils.

Thus from the point of view of the teacher's prepara-

tion for his class exercise, the unifying principle is found in the subject matter and is manifest in a close organization of some kind; but from the point of view of the teaching process, the basic guiding principle is not found in the lesson, but it must be found within the minds of the pupils. The process becomes psychological rather than logical. The focus changes from the closely organized lesson material to the nature of the individual pupils and the way that each reacts to the lesson content and to the changing situations arising from the socialized efforts of the group. This high demand grows out of the need of conserving and developing individuality.

The newer pedagogy which stresses the workings of individual intellects and emotions makes a heavy demand on the teacher as he moves through the materials of the lesson: he must be sensitive to signs of misunderstanding on the part of his pupils; he must be adroit in putting questions that will lead the class to an appreciation of each topic considered; he must quickly devise problems that will firmly fix the value of the points of the lesson, relative both to the main thought of the lesson and to the life of each pupil; he must always have at hand concrete instances for illustrative purposes if his explanations are to be lucid; and he must have a sufficient sense of humor to guard against weariness. As already noted in a preceding section, this is what is meant by insight and resourcefulness on the part of the teacher. The teacher with this equipment is able to make the interests and needs of the individual pupils the controlling principle of the recitation, rather than the academically conceived demands of the subject matter.

Sometimes it is the function of the teacher to insist on accurate reports of facts and impressions gained by the pupils from a study of the textbook assignment;

sometimes he is receiving reports on supplementary reading; sometimes it is his duty to clear up difficult or obscure points in the lesson; sometimes it is his prerogative to amplify and enrich the thoughts found in the books; sometimes it is his privilege to aid the pupils in determining values, both material and moral; and usually the teacher finds it profitable to lead the class to bring together and sum up in a systematic way the net results of the entire study. But in all these phases of the recitation, the guiding principle is the same: namely, ministering to the interest and needs of the individual pupils by means of the organized lesson material.

Again we seem to be confronted with two opposing principles, both suggested by our study of adolescence: it has just been said that (1) the higher unity is to be found in the interests, needs, and capacities of the individual members of the class as they are made apparent by the interplay of the social forces at work during the recitation; and (2) it is imperative that a definite unit of instruction centering in the subject matter be continually kept in mind. Can these opposing principles be harmonized?

The doctrine that the unifying principle must be found in the workings of the pupils' thoughts and feelings can easily prove dangerous to the inexperienced or passive teacher. Unless the teacher exercises a restraining and guiding influence, the class may soon be chasing hither and thither various mental will-o'-the-wisps. This state of affairs will quickly prove very distasteful to the stronger members of the class who naturally enjoy exercising their growing powers on systematic reflective thinking; and the futility of such a performance will be apparent to all pupils of normal intelligence.

The psychology of adolescence, as well as general

psychology, justifies the selection of some one unifying thought or object and the making of a constant return to this unit of instruction, however far afield the class discussions may be led by the demands of individual interests. The modern field of knowledge is large and the ramifications of its various elements are so intricate that the teacher will do well, in the interest of unity, to fix upon some typical case of the object or principle to be mastered and study it with as much intensity as the maturity of the pupils will warrant. This will guard against placing before the class a number of facts all on the same level of importance, a procedure contrary to the teaching of modern psychology. As Professor Dewey has pointed out, "The mere multiplication of objects of comparison is adverse to successful reasoning. Each fact brought within the field of comparison should clear up some obscure feature or extend some fragmentary trait of the primary object." [1] There must be a constant reaching out for particular and interesting facts with which to enrich the subject under study, and there must be just as constant return to the primary object. This establishes order among the multifarious details that are brought in by following the various interests of the pupils. Again Professor Dewey says that this "working back and forth preserves unity of meaning while protecting from monotony and narrowness." [2] Significant features are thrown into relief, and the minds of the pupils are "defended against the deadening influence of many isolated particulars and also against the barrenness of a mere principle." The particular and familiar instances furnished by the pupils, with their varying interests, ensure concreteness and can be made to point the proper emphasis; and a repeated return to the main thought of the lesson converts the particulars into a

[1] *How We Think.* Heath. [2] *Ibid.*

coherent organization and supplies training in reflective thinking. The adolescent is ready for this systematic method of dealing with thought material, and the opportunity to use his developing powers gives real satisfaction.

Thus, again, are harmonized two seemingly opposing principles in education: In the choice of material for illustration, comparison, enrichment, and emphasis, the interests of the individual pupils are the determining factors, while the logical demands of the subject studied must supply the unifying idea. From the standpoint of the teaching process, the highest unity is reached only when all the ideas presented during the recitation have been brought into unity with the life interests and needs of the individual members of the class; and this demands a high degree of insight and resourcefulness on the part of the teacher, who is the harmonizing and unifying agent.

IV

In discussing the economy of classroom management, Professor Parker cautions against misdirected time and energy. "The school is a complicated, specialized institution, maintained by society to achieve certain specific results. The classroom activities should be planned carefully to make sure that they are directed toward securing these results most economically and efficiently, and the possibility of misdirected time, effort, and energy should be reduced to a minimum." [1] Every reader will readily assent to these two very general propositions. Business and industrial organizations are to-day thinking much concerning the application of the second. But what are the specific results demanded by enlightened society, and how are they to be secured economically and effectively so far as class-

[1] *Op. cit.*

room methods are concerned? The foregoing discussions have been an attempt to answer these questions, and all that follows is a continuation of this attempt.

From the point of view of this book, the "specific results" that the high school is expected to achieve center in the development, to the fullest extent of their varying capacities, of the minds and characters of adolescent boys and girls. According to Dewey's vigorous assertion, "How one person's abilities compare in quantity with those of another is none of the teacher's business. It is irrelevant to his work. What is required is that every individual shall have an opportunity to employ his own powers in activities that have meaning." This desired development is dependent, so far as the school subjects are concerned, very largely upon the success with which the thoughts and emotions of the pupils are directed during the class period.

This brings us again to a further application of our knowledge of the adolescent intellect. As we have seen, the adolescent is more interested in content than in mere form; a large survey of things, rather than a microscopic examination, appeals to his widening powers of thought; and anything that smacks of pedantry or fussiness is likely to weary him. This clearly suggests that the high-school teacher should aim at culture rather than mere erudition. The stronger high-school pupils are not greatly interested in the acquisition of items of information, however learned this information may appear. The pupils are greatly concerned with everything that makes for culture, using "culture" in its original sense of promoting growth. This is a way of saying that, if the subject matter and the method of its presentation tend to improve and refine the mind, the pupils will be interested, and their school activities will have meaning. On the

side of method, this "growth" includes such matters as a good speaking voice, appropriate language, logical grouping of the material presented, talking to the point, and refinement of manners. These make for culture; and they are conducive to individual welfare, correct living, and rational conduct, whereas everything that verges upon pedantry and erudition of the ostentatious type fails in its appeal and is often repulsive because it corresponds to nothing worth while in life.

Not only must there be evidence in the recitation of the influences that are generally understood as cultural, but as will appear in the following chapters, the mental processes peculiar and essential to the particular subject taught must be constantly in action if the subject is to make its strongest appeal and have its full educative value. For example, in algebra the pupil must be constantly called upon to examine mathematical relations in a purely abstract way, the particular yielding place to the general.[2] In geometry the meaning of proof is always in evidence, and the various powers of the mind that are involved in proving are continually exercised. In the sciences the pupil is called upon to make inferences from ascertained data.[3] In history the power to think from cause to effect and to understand the relation of events and their political and social significance finds exercise.[4] In composition adequate self-expression in language is the ability that is trained, and in literature the pupil cultivates the powers needed for interpretation and appreciation. These various powers that are called into play may be thought of as the intellectual tools of the subjects, and the degree of satisfaction and consequent benefit that comes from any high-school subject is dependent in a large measure upon employing the appropriate intellectual powers. Nearly all high-school pupils are sufficiently developed to sense the fitness of the method

to the subject, and they derive a feeling of security and satisfaction that naturally comes from appropriate and adequate treatment. Here again the insight and resourcefulness of the teacher are involved. In order that the mental processes shall be appropriate to the subject matter in hand, he must understand the adolescent mind, and he must know the essential nature of his subject and the mental disciplines that are peculiar to its treatment.

V

There is a principle, recognized in nearly all recent educational literature, to the effect that a pupil is educated only by his own mental responses and not by the stimuli provided by the teacher. This important principle of self-activity is especially significant in connection with the education of adolescents for at least two reasons: (1) as we have seen in our study of adolescent instincts, self-assertion is instinctive and is especially characteristic of the period of middle adolescence, which exactly corresponds with the age of pupils in the American four-year high school; and (2) the powers of the mind are parelleling the rapidly elaborating anatomical structure of the hemispheres of the brain, so that the adolescent naturally finds joy in exercising these developing functions. Sometimes the rush of enthusiasm that accompanies this instinctive self-activity of high-school pupils seems almost irresistible. This clearly suggests that the technique of the classroom shall never be such as to dampen this youthful ardor or to remove any of the load that the pupils are able to carry.

Thus the teacher's efforts are confined largely to arousing responses. The less the teacher does and the more the pupils do, the more educative are the classroom activities. These self-activities take many

forms, such as acquiring motor skill, learning and using a vocabulary (either native or foreign), practicing the expression of ideas, exercising the various forms of analytical thinking, and learning the technique of problem solving. The teacher must not only stimulate the right responses, but he must be skillful in recognizing the responses that are really the result of self-activity. It is very easy for both pupils and teacher to be deceived in this matter, since mere words are not very reliable evidences of intellectual effort. Thus one of the important aims in all classroom procedure is to secure that self-activity which is based on the pupil's instinctive self-assertion; the method employed must be determined by this aim.

Curiosity, too, is an instinctive basis of self-activity. The high-school teacher who is attempting to shape his methods of instruction to the nature of his pupils is always mindful of their natural curiosity. We found in our study of the adolescent intellect that there appears at this period a new kind of curiosity, which Dr. Bagley and other authorities class as an adaptive instinct. This is often strong and manifests itself, when duly stimulated, in an impulsive desire to investigate and determine the nature of nearly everything that appears new or strange; and this instinctive curiosity often spurs on the youth when there is no conscious connection between the knowledge sought and the uses it may serve. He simply wants to get behind the scenes. He is especially curious, as we have seen, about both physical causes and human motives. Sometimes this curiosity simply gives rise to an alert mental attitude, and sometimes it leads to the most intense mental effort. Since, as Professor Parker asserts, this curiosity is probably a special phase of the instinct of mental activity, it is easily aroused; and its neglect is inexcusable.

It is not always necessary that the thing or the idea presented be really new; it is sufficient if a new phase or an unmastered principle of the matter under consideration be brought to the attention. Concrete and specific things, when presented in some novel aspect, will always challenge the attention. The novelty may take the form of a new and striking interpretation of familiar data, it may grow out of some new and unexpected generalization based on well-known facts, or it may arise from some unthought-of significance of a familiar instance or incident. The skillful teacher seeks the new and striking in his subject matter, but not the far-fetched or the fanciful. Parker gives the following suggestive examples: Contrary to general opinion, water often runs up. Although the Declaration of Independence so states, men are not created equal. Although England is a monarchy, its government is more democratic than ours. Although hard for the people of the North to believe, the South with the resources of the North might have won the Civil War.

The teacher who understands and successfully appeals to the instinctive curiosity of his pupils secures and holds the attention without which he cannot really teach.

VI

Another way in which the classroom work of the high school must differ from that of the elementary school, if the intellectual needs of the pupils are to be the determinants, is in the relative amount of time and effort that is given to the thought processes of the subject. The child and the preadolescent, as we have seen, are well satisfied with a knowledge of individual facts and instances. They are not generally much interested in any scheme of grouping which appears to them as isolated facts and experiences; their curiosity

does not lead them beyond a desire to learn how things can be made to contribute to their immediate welfare and happiness. Their attitude toward affairs and people generally is practical and seemingly selfish. But with the advent of adolescence, this purely selfish attitude gradually gives place to another and very different tendency of mind. "Adolescence," according to Pechstein and McGregor, "is essentially a period of mental expansion, and mental energy is turned quite naturally to the scrutiny of many things heretofore taken for granted." [1] There develops a tendency to try in some way to connect new facts and experiences with knowledge already possessed. A particular instance, as such, ceases to satisfy, even if it can readily be turned to account. It seems to have little significance, and hence is intellectually lacking in interest until it can be made to take its place with other individual instances or experiences. The individual finds explanation, meaning, and interest only when the instance can be *brought into* the same category with other instances. In other words, the youthful mind finds satisfaction in passing from the particular to the general.

There comes a time when the mature philosophical mind appears to revel in mere abstractions, but not so with the youth; to him general principles are barren and without appeal until they find their meaning in the concrete. The human mind tends naturally to pass from a particular fact or experience to some general principle and from the general principle to an individual fact that illustrates the principle. This natural tendency which develops rapidly during the high-school period must have continual recognition. "The recitation is a place and time," as Dewey asserts, "for stimulating and directing reflection, and re-

[1] Pechstein, Louis A., and McGregor, A. Laura, *Psychology of the Junior High School Pupil.* Houghton Mifflin.

producing memorized matter is only an incident—even though an indispensable incident—in the process of cultivating a thoughtful attitude." [1] In short, more thinking is to be demanded of high-school pupils, and this thinking is to be on a higher level. All this means that the high-school teacher's equipment must include some knowledge of how we think.

Since Aristotle's time, writers on this subject have classified thinking as inductive and deductive, and the definitions and discussions concerning these two forms of reasoning have filled many volumes. Writers on pedagogical subjects usually pay their respects to this ancient classification of our thinking processes. The ability to make correct inductions and correct deductions in the affairs of everyday life is without doubt of the utmost importance, making for success in every line of effort; yet it is difficult to see how very much that is really practical in either logic or pedagogy has been derived from this way of classifying inferences. As generally treated, the classification recognizes only the most simple and evident forms of argument, ignoring entirely other forms of reasoning; as for example, the complicated forms usually designated as circumstantial evidence. When we use circumstantial evidence (and this is very often), the reasoning is neither purely inductive nor deductive, as these terms are commonly defined. In this circumstantial reasoning, our purpose is sometimes to prove a particular fact; hence there is no true induction. On the other hand, we can hardly class it as a deduction, since there is no reasoning from a general proposition. As Professor Bode has pointed out, "We do not proceed from the universal to the particular, but universal and particular are evolved by the same process." [2] If this analysis is

[1] Dewey, John, *How We Think*. Heath.
[2] Bode, B. H., *An Outline of Logic*. Holt.

correct, two conclusions seem to emerge: (1) the mental processes that we are accustomed to call inductive and deductive are merely different aspects or phases of the same mental tendency; and (2) the terms fall far short of covering all forms of reasoning to which high-school pupils are to be introduced. As a consequence, the present account of classroom procedure foregoes the usual formal defining and discussing of these terms.

Frequently the term "induction" has been broadened so as to apply to all the forms of reasoning used in the sciences; this way of using technical terms causes them soon to lose their distinctive meaning and renders them almost useless for purposes of clear discussion. However, without attempting any further distinctions or classifications, we shall assume that well-conducted educative processes in high-school subjects involve much inductive thinking in the narrow sense of the term; and for a helpful treatment of the matter the student of classroom methods will do well to read John Dewey.

Books on education have long told us that we must "proceed from the concrete to the abstract" when we find it necessary to teach abstract ideas; again, we are advised to "proceed from the particular to the general." But Dewey has shown us that, unless the concrete or the particular is already familiar and well known through actual experience, the thought processes involved are not educative, and the generalizations and abstractions reached by the pupils add nothing to their wisdom; indeed, real harm may be the result, since the saying of words without the needed concrete background furnished by experience in or out of school tends to deceive both teacher and pupils.

Good method demands that appeals to the intellect be based at some point in the process on the use of the senses and that all appeals to the emotions and all

moral instruction must grow out of emotional and moral experiences. As Dewey sums up the matter, "However advanced the person is in knowledge or scientific training, understanding of a new subject or a new aspect of an old subject must always be through these acts of experiencing directly the existence or quality in question." [1]

The careful teacher finds ways of bringing about these necessary basal experiences, and the teacher with insight soon discovers that many pupils possess a considerable store of actual experiences that is entirely adequate and ready to be drawn upon as the needs of the classroom occur. The affairs of the outside world are rich in teaching material; all inductions do not demand a basis of laboratory experiments. It is the teacher's part to stir the imagination and revive the memory of the experiences that supply the foundation for the new point of view. Neither in the classroom nor in life do we always rely upon a vigorous application of the methods of formal logic or science, but we do attempt to harmonize the matter in hand with a large body of previous experience; the mass of old experiences is made to assimilate the new facts. Thus it is that the pupils are led to general truths which may be retained and, by the reverse deductive process, be made to function in the practical affairs of life.

Nearly all discussion of the steps of the teaching process leads one to think that the formulation of the abstract or general truth is the final and culminating act of the inductive method. Professor Dewey warns us against this bad pedagogy. "Generalization is not a separate and single act; it is rather a constant tendency and function of the entire discussion or recitation. Every step forward toward the idea that comprehends, that explains, that unites what was isolated and there-

[1] *Op. cit.*

fore puzzling, generalizes." The work of stating the general truth aimed at should also be a gradual process, a development in the mind of each pupil; it is "essentially the growth of a meaning out of vagueness into definiteness." But summary there must be; it is the way the net meaning emerges from particular facts. "Only as general summaries are made from time to time does the mind reach a conclusion or a resting place, and only as conclusions are reached is there an intellectual deposit available in future understanding." [1] In making the approach to the culminating purpose of the lesson and in supplying these summaries so much needed, the teacher with insight is mindful of that phase of his task which grows out of the individual natures and capacities by which he is surrounded. As many pupils as possible will contribute to these summaries, and class unity will be maintained. If in all this the teacher is dexterous, there will come to his pupils the satisfaction that arises from the increasing use of growing powers.

VII

It is the purpose of this chapter to aid in determining the use to be made of the recitation period; but the inexperienced teacher may rightfully demand that we come to closer quarters with the question, "What is the function of the recitation?"

Every reader has doubtless at some time been a member of a class where all the time and energy were given over to repeating, often in a very halting and wearisome manner, the facts and principles that the pupils had attempted to learn from the textbook. It would seem that nothing could be devised that would be so effective in establishing the domain of boredom in the classroom as the mere repetition day after day for forty-five minutes of exactly the same material found

[1] *Op. cit.*

in the textbook. If interest in this kind of recitation is maintained, it is likely to be brought about by the use of some sort of negative device, such as grades and penalties, or there is an appeal made to the adolescent's instinctive desire to show off, neither of which can be considered a high motive likely to contribute the best elements of character. It would seem that few teachers are fully aware of the seriousness, from the standpoint of adolescent welfare, of the effect of continually boring any group. All writers on adolescence have warned against it. In general, the most vigorous and worthwhile type of pupil simply will not endure continuous tedium in the classroom. He will allow his mind to follow other and more alluring paths of thought, or he will "start something"—either mental or physical—on his own account, or, most discouraging of all, he will betake himself to other more appealing environments outside of the schoolroom.

But all this is negative. How is the recitation period to be used if waste of time and lack of interest are to be avoided? The answer is easy; the thing to be done is extremely difficult and demands the highest teaching skill. Keep every member of the class actively thinking, and thinking in a way that will ultimately lead to the goal that has been definitely decided upon as a worthy objective. This active thinking, which never bores, may follow many lines. (1) Whatever the subject and whatever the textbook, there will always be interest created when the language of the book is interpreted in the light of the teacher's and the pupils' experiences, when the assignment from the text is translated into terms of life, when the lesson materials are projected into the affairs of the outside world. This phase of the recitation is limited only by time and the experience of those participating. (2) If the teacher would stimulate active analytical thinking, let him

give the discussion of the text a critical turn, the criticism being either positive or negative. A sincere attempt to evaluate the words and ideas of another is always stimulating, but especially to the adolescent type of mind. The ability to do this can be cultivated in classroom discussion, and it is worthy of the best efforts of the teacher and pupils. (3) Perhaps there is no phase of classroom activity that more vigorously taxes and better tests all the faculties of teacher and pupils than the effort fittingly to supplement the statements of the text. The memory and the imagination become intensely active, and the mind goes abroad in a rapid search for new and suitable incidents. When the promising material is found, it must be promptly brought into court to be tried as to its fitness for the purpose of really supplementing the textbook. Here resourcefulness and the ability to discriminate on the part of both teacher and pupils have their reward. (4) The practical generally appeals to the adolescent, because he is now thinking much concerning his own relation to the affairs of the social and economic worlds; hence the practical application of the things he learns is extremely interesting and stimulating. There is little permanent interest in anything that appears futile; the lesson that has no worthy application should never have been assigned. Fruitful interpretation and criticism, supplementing and applying assigned lessons make heavy demands upon the insight, resourcefulness, and skill of the well-prepared teacher; and for the pupils there is provided ample scope for the exercise of their imagination and their powers of thought, the best safeguard against boredom.

If a large portion of the recitation period is occupied with the forms of activity just discussed, it does not follow that the pupils cannot be thoroughly tested as to the kind of preparation they have made on the

textbook assignment. On the contrary, the kind of questions that demand careful interpretation, evaluation, or application of the text should stimulate the most thoughtful study of the assigned lesson. Careful reading on the part of the pupils is not sufficient to meet the requirements of this type of recitation; they must do vigorous thinking on their own account, thinking that is guided by the material found in the text and stimulated by the expected discussions of the classroom. The work of testing the preparation of each assignment cannot safely be neglected; but the testing must add interest by bringing to the recitation much new thought and material closely related to the statements found in the textbook.

Naturally the next question is, how is this testing, interpreting, criticizing, supplementing, and applying to be brought about? Shall we do it by using declarative or interrogative sentences? The following account of the art of questioning is an attempted answer.

To those who believe that teaching is a profession demanding special training and possessing its own technique, it must seem an educational truism to say that the major aim in all classroom effort is efficiency in giving instruction and that this kind of efficiency depends in a large degree on the skill that is shown in questioning. Deep and continued interest in any subject depends much more on the technique of the recitation than is generally understood. Mere subject matter will not always hold the attention of the restless adolescent of the motor type, or stir up the dreamy, listless girl in her teens, or keep the brilliant pupil working at his best. Success in testing for knowledge, interpreting and evaluating this knowledge, elaborating and supplementing and applying it depends almost entirely upon the stimulating effects of the questions asked in the class.

Proficiency in choosing and framing questions is needed even in making effective lesson assignments. To be truly stimulating, the assignment should include a few pivotal and thought-provoking questions, questions that cannot be answered by merely reading the text carefully; but there should be, if possible, questions that demand some thinking based on the knowledge supplied by the textbook. The assignment may well include questions to aid the pupils in determining and fixing the salient features of the lesson. But this is not always enough; the assignment should often contain questions whose purpose is to vivify those experiences of the pupils, remote or recent, which furnish a groundwork for the new subject matter of the lesson. In the language of Herbartian pedagogy, there should frequently be a stirring up of the apperceptive mass in the interest of the new material to be treated in the recitation, and this can be effected by one or more suggestive questions directing attention to pertinent facts or principles already known. This supplies a natural basis for the thing to be done and tends from the beginning to secure a well-founded interest.

The real test of skill in questioning, however, begins when the recitation opens. A little thought on the part of any one who has not had the experience is needed to realize the many difficulties involved. It is a truly complicated situation. The elements to be dealt with are numerous and rapidly changing. It is not unlike playing a game of chess against a speedy opponent; the moves are rapid and frequently unexpected, and no one can foresee the responses and the consequent shifting of attention and emphasis. Much of the difficulty grows out of the fact that primarily there must be group thinking and group progress; and this group thinking must be done and this group progress must be made with full consciousness of the individual

differences of the intellects and temperaments that are involved. Many important activities must be kept in mind and correlated. There must be a judicious distribution of questions. A quick decision must be made as to whether the desired answer shall be persistently sought among the members of the class, developed, or supplied by the teacher. The timing of the questions must be watched and suitably adjusted to the nature of the questions used. The teacher is always tempted to come to the rescue of the halting pupil with a leading question or a direct question; and there is a natural temptation constantly to pass upon the value and validity of the answers given, which certainly is not favorable to the development of group responsibility. Then, too, the teacher must not lose sight of the ultimate aim of the course and the stage of development that has been reached—what may be called the setting of the lesson—as well as the immediate purpose of the recitation in progress. These are some of the elements that must be dealt with in the complex situation involved in conducting a recitation. Evidently it is a situation calling for a high degree of mental coördination.

Books dealing with the method of the recitation tell us that this complicated situation demands, on the part of the teacher, (1) clear and rapid thinking, (2) a constant feeling for relative values, and (3) skill in phrasing questions. These are, indeed, among the requirements. But there is another qualification even more fundamental: the high-school teacher must understand the workings of the adolescent intellect and temperament in general and must have the insight which recognizes the individual needs and capacities of the pupils before him. The nature of the human material with which he works is fundamental.

What are the characteristics of good questions? This

depends upon the purpose to be attained and the ability and maturity of the class. In general, it may be said that the questions must be so framed as constantly to place the responsibility and burden upon the class, in so far as this can be done without an undue use of time, and the purpose of any lesson determines the nature of the burden or responsibility.

1. Is the purpose to test the preparation of the assignment? Then the recitation may well be topical, the essential topics being arranged according to the logical demands of the subject matter, or, often much better, arranged conformable to the degree of relevancy to the interests of the pupils. This psychological principle of lesson organization frequently requires much insight on the part of the teacher. Sometimes it is an advantage to have placed on the blackboard in tabular form a brief organization of the lesson, and sometimes it is better to work out the organization as the recitation proceeds. The nature of the subject and the purpose to be accomplished will decide which plan to use. The adolescent usually gets much satisfaction in using his developing powers of organization, and it is one of the functions of the recitation to emphasize thought relations and give practice in reflective thinking. The topic type of recitation makes heavy demands on the pupils, as it requires a sustained effort and forces the pupil to develop his own topic—a splendid form of training.

The discussion on each topic may be initiated either by announcing the topic or by asking a question involving it. It is usually necessary, in the interest of thoroughness, to follow up the pupil's independent account with questions, as pupils of high-school age are seldom able to exhaust the topic assigned. In the high-school classroom there need be no sharp line of demarcation between the topic and the question-and-

answer type of recitation; the maturity and ability of the pupils will determine to what extent the topical method may profitably dominate.

The topical recitation is well suited when the lesson materials are closely bound together by thought relations of any kind. If, on the other hand, the testing is on a large number of relatively detached facts, when little more than memory is needed, as in drills on vocabularies, a rapid fire of short questions and answers is stimulating. Testing the preparation is necessary, as all teachers of experience know, but skill is demanded in order to conserve time. This means that it should be brief and varied in form. It should call for ideas, power to think, and ability to do; and it should be adapted to the subject matter and the capacities and interests of the pupils. Even when well done, testing is likely to be a dreary performance if that is all that happens during the forty-five minutes.

2. The purpose may be to emphasize the salient features of the topics under consideration. This is a worthy purpose. The youth, as was noted in the preceding chapter, lacks perspective in his thinking, and he needs continuous help in evaluating ideas. Here again, the purpose must be worked out with group coöperation. It is a training in judgment forming, and there is no training if the forthcoming judgments are furnished ready-made by the text or the generous teacher. It is at once apparent that questioning for this purpose requires the utmost skill. Many questions are judgment questions in form only. They require only assent or denial, or they are too suggestive. For example, what is your opinion concerning the canceling of an honest debt? Does Poe's poetry create an atmosphere? What is your judgment of Wordsworth's knowledge of the Lake Country of England? What can you say relative to the strength of Roosevelt's personality?

When the teacher attempts to guide his pupils in the process of evaluating or in fixing a perspective, his difficulty often takes the form of a dilemma. If he is determined to be definite and leave no chance for obscurity, he is in danger of framing a leading or suggestive question. If, on the other hand, the questioner resolves to put as little as possible into the question, thus placing the burden on the pupil, as is done in a topical recitation, the question is likely to be too general or too vague, as in the "how about it" questions, and the pupil begins to guess what the teacher can possibly be thinking about. While guiding the group thinking of his class, the discerning teacher often avoids this dilemma by means of a series of questions that lead step by step to the desired point of view. When this is reached, he holds the pupils responsible for their judgments concerning the matter under consideration, further responsibility being imposed by insisting on specific reasons for the forthcoming judgments. This appears to be a natural way to place the desired emphasis in teaching any subject, at the same time making it a coöperative affair. This leading up to a situation demanding a judgment is usually an inductive procedure. For example, a series of instances in the life of Roosevelt, in which the things that happen seem to be brought about by his force of character, leads naturally to a question of judgment concerning some definite Roosevelt characteristic. If this type of instruction can be made effective in training the judgment and developing a sense of relative values, there can be no doubt as to its value, for the ability to judge and see things in their right perspective is synonymous with practical intelligence.

3. Again, the purpose of the recitation may be to guide and stimulate reflective thinking. This thinking may grow out of the textbook material which the pupils

have already mastered, as when there is an enriching of the thoughts found in the book with further reasons for statements, or when other points of view are developed, or when additional applications are made, or when apt analogies are worked out; or the thinking may be along new lines and lead to new facts and principles. This latter purpose is usually accomplished by means of what is often called the development recitation. This, too, is a type of questioning that requires rapid adjustment and various forms of skill on the part of the teacher. When well done and when the lesson deals with a vital subject, the result is intense interest on the part of the class, for pupils of high-school age are naturally eager to enter untried fields of thought and to gain new insight.

In this type of recitation, the questioning in general should not be rapid; there must be time allowed the pupils to make a mental search for the facts or principles needed and to make new inferences and associations. The recitation must be a thoroughly coöperative enterprise on the part of teacher and pupils, in which the natural desire of the pupils to contribute and thus gain approval serves as a strong and wholesome stimulus. This type of recitation generally gives great satisfaction to high-school pupils, especially pupils that are mentally alert and intelligent; it supplies ample scope for all the growing powers.

In the opinion of the author, the development or conversational type of recitation is not identical with the Socratic method, which is usually discussed in connection with the art of questioning. In the dialogues of Plato, in which we are supposed to have a reproduction of Socrates's method, one is continually impressed with the tedious procedure; at least this is the effect of reading the dialogues in translation, though the original Greek may have been more stim-

ulating, since the method was doubtless suited to the Greek type of mind. Some of the defects of Plato's technique, when tested by the needs of the high-school classroom of to-day, are the following: the questions are planned from the beginning to trap the pupil; the individual questions are not generally thought-provocative, being so framed as to admit of but the one answer—that answer which is in the mind of the questioner—so that frequently the pupil seems to follow blindly; the pupil always gets the worst of it, the process often being more entangling than enlightening; the pupil, although generally a Greek adolescent boy, never asks questions; and the great mass of detail through which he is led frequently seems confusing, and one feels that a more direct method would be more economical and effective.

However, the Socratic method, as exemplified by Plato, has its lessons for the high-school teacher. The questioner always had his goal—the "aim" of the modern recitation—definitely in mind and never forgot it, however perplexing the maze through which he led his pupils. He trusted largely to the experience and native ability of his pupils for their answers; he stimulated them with self-contradiction; he always used a close sequence of questions; and, especially in the earlier dialogues, he continually recognized the individuality of his pupils, a modern touch indeed. If the above is correct, the Socratic method, as exemplified in Plato's dialogues, is suggestive; but it is not identical with the development methods used by Herbart, Pestalozzi, and Froebel, or with the best practice of modern schools.

The reader will understand that the purposes of the recitation here discussed are not kept distinct in practice, but that one blends into or gives place to another as the occasion requires. The present treatment of

purposes of the high-school recitation is far from exhaustive, and further discussion will be found in later chapters. Perhaps the best kind of preparation for the teacher who is determined to improve his skill in questioning is the same as for the one who would make a good speech. After the subject matter to be presented is well in mind, *think it through* as many times as possible with a view to deciding the most effective way to deal with the material.

While preparing for his class work, the teacher may well have in mind "the formal steps"—concerning which discussions of method used to say so much,—since these steps are suggestive as to the phases of the recitation that should be covered; but they certainly do not point out the necessary mental path for the learner to follow; hence they do not indicate the actual course in teaching. The five formal steps are logical and helpful to the mature mind that understands the subject matter; but from the standpoint of the learner, they are not always psychological, since they do not indicate the way the mind naturally moves through new materials of thought.

Drill is another phase of the educative process and an essential part of classroom technique. As explained in the preceding chapter, drill is not naturally offensive to the preadolescent; he likes the practical skill and assurance that result. But with the adolescent the matter is not so simple; he enjoys conquering new realms of thought, but he is easily bored. Yet all experienced teachers know that there are many phases of high-school subjects that cannot safely be passed over without considerable thorough drilling. The subject matter on which we have been accustomed to drill is often fundamental; hence it must be mastered in order that the new processes may not be handicapped by old entanglements. It is usually a matter of clear-

ing up one basic difficulty before attempting another.

Like the other phases of the recitation, drilling must, as far as possible, be controlled by psychological principles. Professor Colvin's statement is fundamental: "Drill all pupils in terms of their abilities and according to their needs." [1] Here we meet again the principle of individual differences, but its application to the drilling process is sometimes difficult. We may aim at individual conformity to certain standards of skill and accuracy; but we cannot, without violating the principle of individual variation, expect uniformity in results.

Skillful drilling seems to include at least three processes: intelligent motivation, correct initiation, and effective focalization. (1) The adolescent does not resent the repetition involved in drill, provided he really appreciates the need of this repetition and sees clearly how the skill or ready knowledge gained by it applies to worth-while problems. This implies that drill work must be based on an adequate stirring of the imagination, a stimulation of personal perception, and sufficient explanation and demonstration to supply the intellectual demands. Drilling must result in more than mere automatic skill; hence some means of motivation must initiate and accompany the work. If it were possible perfectly to motivate a drill lesson, the whole class would voluntarily and enthusiastically enter upon the necessary practice and continue until the point of diminishing returns is reached. (2) Long ago William James made clear the importance of correctly initiating any procedure that we aim to make habitual; for unless the physical or mental process is correctly launched, practice does not make perfect, and any other kind of practice is sure to be harmful. (3) Perhaps the distinction between motivation and focalization is not

[1] Colvin, S. S., *Introduction to High-School Teaching.* Macmillan.

important; but as used here, focalization suggests the necessary continuous mental concentration upon the process and unflagging zeal for the outcome of the performance. The aim is intellectual, rather than physical, thoroughness; and this thoroughness ensures a feeling of satisfaction as the practice proceeds. Proper motivation and focalization supply the conditions which make for growth, without which drill is not an educative process.

"Drillmaster" is a word of doubtful connotation. The teacher who drills efficiently keeps before his pupils a clear idea of the thing to be done; he aims at accuracy rather than speed, for repetition brings speed; and, if necessary, he observes the principle of individual differences by arranging relatively homogeneous groups and drilling them "according to their needs," a sort of laboratory procedure that recognizes the abilities of the differentiated groups.

Nearly all books that deal with the recitation warn us against certain faults and forms of questioning. These warnings had better not be understood as absolute, because sweeping negatives are difficult to defend in this as in other matters. The following are examples of the negative admonitions referred to. "Do not yield to the temptation to pursue an individual pupil, but teach the class." Sometimes the teacher can best stimulate both the individual and the class by making it evident that an individual may upon occasion be vigorously pursued. "Do not assist a pupil, but let him work out his own salvation." Obedience to this negative advice would often ignore the principle of individual differences, which is fundamental if education is to have a psychological basis. "Do not repeat a question." Are there not dozens of reasons for repeating, provided the repetition does not cater to some one's inattention? "Do not recast a question."

This seems to assume that the minds of the pupils are all of one cast, again a disregard of individual differences. "Do not ask 'yes' and 'no' questions." Why not, if the reasons for the answer are demanded in the next question and these reasons are based on certain knowledge or sufficient experience? "Do not ask questions that can be answered by a single word or phrase, 'blank-filling' questions." What is the objection if there is assurance that the word or phrase represents a rich background of knowledge or experience? "Do not ask leading or suggestive questions." Skillful teachers know the function of this type of question when the purpose of the recitation is to open up new fields of knowledge or develop new principles. "Do not spend time testing the memory, but use class time to stimulate thinking." This advice merely points to a rather common abuse; we all know that thinking in all practical forms both in and out of school is based on facts and facts must be held in the memory. "When questioning, do not repeat the pupil's answer." What better way has the teacher of occasionally placing his approval on a splendid piece of work? In brief, all these negative injunctions may be disregarded whenever the teacher can by so doing better accomplish the purpose of the particular recitation; the real artist never hesitates to set aside the conventions of his art in the interest of the thing to be accomplished.

The aim of this chapter has been to deal only with teaching problems as such; this does not include the mastery of subject matter, which is assumed. The teacher's problem is the *adjustment* of the subject matter to the nature of the individual pupils. That the teacher has continually a sense of this problem is essential to his improvement in the art of controlling classroom procedure. There has been no attempt to prescribe formulas and recipes to be followed by teachers.

It has been assumed that method in teaching is, as Dewey asserts, "the personal concern, approach, and attack of an individual, and no catalogue can ever exhaust their diversity of form and tint." [1] Too long pedagogy has been in disrepute, because it has undertaken to hand out definite prescriptions and because the results have been of necessity a mechanical attempt to follow these carefully worked-out prescriptions. Effective teaching must ever be an expression of the teacher's own intelligence applied to the teaching problem as here stated. As to form in method, nothing can be "authoritatively recommended to teachers," hence the aim has been to present and discuss principles that are believed to grow out of our present understanding of the psychology of adolescence, leaving the mode of their application to the individual initiative and insight of the teacher.

[1] Dewey, John, *Democracy and Education.* Macmillan.

CHAPTER IV

MATHEMATICS

From the beginning of secondary education in this country, mathematical subjects have occupied a very secure place in the curriculum. During much of the time, they have been almost on a level with the ancient classics; this has been true especially of algebra and geometry. The present position of algebra and geometry, when we take into account the great influx of new subjects, must be gratifying to all who believe in their efficiency for purposes of secondary education. The report of the United States Commissioner of Education for 1916 shows that there was a marked ascent in the algebra curve from 1890 to 1905, and a gradual rise in the geometry curve from 1890 to 1910; though, during the first decade of this century, practically all the other old subjects of the curriculum registered a relatively smaller number of pupils, the change being due to the introduction of a large amount of vocational and semi-vocational work. Although a place for the vocational branches had to be made by sacrificing time that was formerly devoted to the old subjects, in the year 1914–1915, practically half the pupils in our secondary schools were studying algebra, and over one-fourth were studying geometry.

The enviable position of both algebra and geometry is without doubt due to a considerable extent to the fostering influence of the colleges, in nearly all of which there has been a vigorous demand for these subjects as entrance requirements.

Whatever view one may hold concerning the relative

worth of these subjects, their place in the history of secondary education and their present status emphasize two important facts: (1) As the result of long experience, there has been sifted out and accumulated a large amount of standardized mathematical material that is believed to be suited to the needs of high-school pupils, and the methods of presenting this material have, through long practice, been much improved. (2) The teachers of high-school mathematics cannot well neglect to profit by all that has been accomplished in their field. It is the purpose of this chapter to present briefly the results of this long experience in so far as these have influenced methods of teaching algebra and geometry.

From the point of view of this book, there are three considerations that will guide and largely determine what is here said concerning the teaching of high-school mathematics. They are: (1) the nature, needs, and capacities of adolescents in general; (2) the principle of individual differences; and (3) the function or purpose of algebra and geometry as part of a rich and complex program of studies. Regarding these determining considerations, the late Professor Inglis of Harvard University has spoken wisely. "Until the teacher of mathematics fully recognizes the fact that the pupil, not the subject, is the unit to be considered and that the mathematical experiences of the pupil constitute but a small part of his total experiences, much of the value of the study of mathematics must be lost. No education can be successful unless the experiences of the individual are unified." [1]

As to the first of these considerations, it should be noted that algebra and geometry, in so far as the thought processes of the subjects are concerned, have been well placed in our secondary-school curricula.

[1] *Op. cit.*

Algebra is generally taught in the first year of the four-year senior high school and plane geometry in the second or third year. In the light of what we know concerning the development of the adolescent intellect, it would seem that they could not be placed much earlier, unless we propose to confine our efforts to the more mechanical processes of algebra and the concrete and constructive phases of geometry. On the other hand, if these subjects were placed later, we should lose the advantage that naturally arises from attacking those phases of mathematics that demand reflective thinking at the time when the power to do this kind of thinking is developing most rapidly. But whatever aspects of these subjects may be given the emphasis and whatever courses in algebra and geometry may be placed in the curriculum, the most fundamental determining factor, so far as method is concerned, must always be the interests and the natural and acquired abilities of the individual pupils taught.

As regards the third consideration mentioned above, namely, the function of high-school mathematics, the sentiment in this country has changed greatly during the past twenty-five years. In 1899, the National Education Association sponsored the idea that "work in mathematics should be required of all pupils throughout each of the four years"; this radical demand must have been based upon a conception of the functions of algebra and geometry very different from the opinions now generally held by the leaders in both secondary and higher education. The views now held as to the true significance of mathematics in the lives of high-school pupils have led the colleges to be less rigid in their entrance requirements; and those responsible for the high schools are generally convinced that the interests and needs of many high-school pupils are better met by devoting a larger proportion of time to other subjects.

Among the causes for this changed opinion regarding the functions of algebra and geometry are at least three that appear important. (1) The facts and principles relative to individual differences, the second consideration mentioned, have received intensive study, have been scientifically established, and have been applied with much sincerity to many phases of secondary education. (2) The studies and discussions concerning formal discipline—the chief defense—that have been going on during the past twenty years have resulted in a new interpretation of theories relative to the transfer of acquired efficiency. (3) Theories and public opinion regarding the function of the public high school have changed, leading to a more determined effort to minister to the social and vocational needs of the pupils. Notwithstanding the operation of these and other causes tending to remove the emphasis on mathematics in our high schools, probably, on an average, one-eighth of the pupil's time is still given to the study of some form of high-school mathematics.

How do algebra and geometry function in life? Without much investigation, it was believed in early times that mathematical knowledge functions frequently and directly in the affairs of life. Later, when the absurdity of this notion came to be realized, it was thought that both algebra and geometry furnish splendid training for the various mental "faculties." The mistake concerning utility probably grew out of the failure to distinguish between the usefulness of mathematical knowledge to the race and the direct utility of this knowledge to the individual; even as keen a thinker as Herbert Spencer was guilty of this fallacy. The great faith in the subject matter of mathematics for disciplinary purposes rested on the assumption that a vigorous exercise of perception, memory, imagination, or reason trains and strengthens these faculties for

any use they may be put to. This is not the place to recount the oft-repeated arguments for and against formal discipline; the psychological battle has been waged vigorously and with considerable partisan spirit for over twenty years; and, in the opinion of several experts, some dependable and practical conclusions have been reached. Let us now attempt to apply these findings and the latest ideas concerning utility to our problem of determining the exact function of high-school mathematics; for as already indicated, the function should settle many things relative to method.

Even the specialists in the field of secondary-school mathematics have conceded that, as the subjects are now organized, the ordinary person derives very little knowledge that he actually carries into the concerns of everyday life; hence these subjects cannot be justified on the ground of the useful knowledge imparted. The statement applies especially to the knowledge of mathematical principles and processes. This is a very different matter from a knowledge of mathematical results, which have frequent and important uses both in common affairs and occupations and in other school subjects. After all non-useful deductions are made, there are a few mathematical facts, principles, and processes that have direct and specific value for many people. These practical elements are found in arithmetic, algebra, and geometry, and it would seem that they might profitably be organized into a course suitable to the interests and needs of pupils in the junior high school or the upper grades of the original elementary school. Such a course would have practical value for all who leave school early; and as Inglis suggests, such a course "would also serve as a valuable prognostic factor for those who would later in the senior high school undertake the systematic study of algebra,

geometry, or other higher mathematics." [1] Thus far we have been concerned only with the direct value of high-school mathematics.

When we turn to a consideration of the claims touching the indirect values of algebra and geometry, the case becomes extremely interesting; and because of its complexity, it demands rather careful scrutiny. It is in this part of our study that we may expect to find considerations significant from the standpoint of method.

One of the functions of high-school mathematics to which nearly all writers call attention is the enlarging influence that these subjects have upon our concepts of number and space relations; for these concepts are without doubt fundamental to our intellectual life and thus worthy of serious consideration. Somewhat closely connected with this enlarging influence of our ideas of space and number is the effect that an intelligent study of algebra and geometry produces upon one's language. These sciences have a well-developed and peculiarly effective form of expression which the pupil under proper instruction naturally makes his own and thus grows into the power both to conceive and interpret quantitative and spatial ideas and to express these ideas in their corresponding language relationships. It is, of course, impossible to determine definitely the extent to which mathematical experiences furnished by the usual high-school courses function in these interrelated ways.

But the most careful analysis is needed to ascertain the function of mathematical studies when viewed in the light of what is now believed to be true by the best authorities relative to the transfer of acquired efficiency of any kind. If algebra and geometry do not function helpfully in this way, there is little left to talk about.

[1] Inglis, *Principles of Secondary Education*. Houghton Mifflin.

This is admitted by Young, Smith, Schultze, and other recent and vigorous proponents of high-school mathematics. These men say that primarily mathematics exemplifies "certain modes of thought," that it has value "as an exercise in logic, as a means of mental training," and that it is taught "only secondarily on account of the facts it imparts." From this it is apparent that any fundamental study of the methods of presenting algebra and geometry must focus on the possibility of the transfer or spread of acquired efficiency to non-mathematical fields and the manner in which this transfer can be most surely effected.

Our discussion now calls for the following brief statement of some of the conclusions relative to the doctrine of transfer. It is not now generally believed that we train the memory, imagination, or reason, as such; but that we do develop memories for certain groups of related experiences, that the imagination becomes fertile in any definite field when successfully used in this field, and that the power to reason may be trained to move more freely and accurately when dealing with certain familiar and related materials. Further, there is developed through the exercise of these powers many valuable mental traits, attitudes, and ideals; and these traits, attitudes, and ideals may be transferred into realms somewhat foreign to the ones in which they are developed. In this sense, then, transfer is possible. Next, to understand the way in which this spread or transfer is brought about, one must comprehend the workings of the laws of dissociation; for these traits, attitudes, and ideals, if they are to function, must be disentangled from the experiences in which they were obtained and carried over into new fields and novel situations. William James was one of the first psychologists to dwell with special emphasis upon the fact that experience is built up by

dissociation as well as by association and "that psychology must be writ both in synthetic and analytic terms." James has also furnished us a clear and brief statement of the law of dissociation by varying concomitants. "What is associated now with one thing and now with another tends to become dissociated from either, and to grow into an object of abstract contemplation." [1] It must not, however, be assumed that this law always works automatically; on the other hand, a conscious and definite effort is often necessary to ensure its operation. When applied to the transfer of mental traits, attitudes, and the like, it means that the materials with which we are dealing must be so organized and presented as to make dissociation of the thing to be transferred natural and easy. When we apply this to high-school mathematics, we must realize that the degree of success that we attain in transporting the desired traits, attitudes, and ideals to other fields of mental effort depends upon both the selection and organization of mathematical material, but more especially upon the method of presentation.

What are some of the habits, attitudes, and ideals, according to their champions, evolved and fostered by algebra and geometry? It is maintained that there are certain methods of approach and habits of procedure "involved in reflective thinking" which are carried over from mathematics to other thought subjects. This is certainly an important claim. As examples of these methods and habits may be mentioned habitual alertness to suggestive cues, the habit of frequently referring to well-known type situations and problems as a practical means of orientation, the habit of generalizing and extending the range of attention, a method of orderly procedure combined with the habit of carefully scrutinizing each step of the reasoning process, the

[1] *Op. cit.*

habit and power of sustained effort, and the attitude of self-reliance that grows out of honest and successful effort. No one doubts that all these mental and moral traits are exercised when the principles and processes of algebra and geometry are vigorously pursued; hence there can be no point of dispute unless it be regarding the probability of their transfer, and it is hoped that it will appear in the following chapters that the degree of probability is determined largely by the organization of material and the method of presentation, which, as has been pointed out, involves a constant recognition of the psychology of dissociation. In presenting the claims of the proponents of high-school mathematics, Inglis says, "The materials of mathematics, ranging all the way from the simplest to the most complex, may be manipulated almost at will, thus permitting the arrangements of conditions most favorable to dissociation." [1]

It is important to note in this connection that adolescence is a time *par excellence* to cultivate the mental habit of transferring desirable elements and traits from one field of effort to another. As already pointed out, it is a period rich in instinctive impulses and interests, both practical and esthetic; and James is our authority for the doctrine that a creature endowed with many and varied impulses and interests naturally dissociates many characters and consequently reasons well. "The diverse interests lead, too, to a diversification of experiences, whose accumulation becomes a condition for the play of the law of dissociation by varying concomitants." [2] Thus it would appear that both the character of the subject matter and the nature of the adolescent are favorable to the transfer of valuable traits, habits, attitudes, and ideals from mathematics to other fields of effort both in and out of school.

[1] *Op. cit.* [2] *Op. cit.*

There is little reason to doubt that beginning algebra and Euclidean geometry, as now organized and taught, are among the most difficult subjects in the high-school curriculum; this is indicated by the percentage of withdrawals and failures in these classes when good standards of scholarship are maintained. As a consequence, every possible means of improving the organization of material and the method of teaching should be considered. There are doubtless many ambitious young teachers and prospective teachers of high-school mathematics who are earnestly seeking definite help in these matters. In attempting to be specifically helpful, we had best deal separately with the teaching problems connected with algebra and geometry, since the aims, functions, and methods are not in all points identical. This separate treatment will not interfere with emphasizing the relation between the two subjects and the frequent opportunities for correlation.

Commercial arithmetic, mechanics' arithmetic, and farm arithmetic have been added to the program of studies in many high schools. The principles and processes involved in these subjects and the methods employed in presenting them do not differ sufficiently from those connected with algebra and geometry to warrant separate treatment. The same is true in general of trigonometry, which is not discussed in this book.

CHAPTER V

ALGEBRA

I

There was a time when algebra was correctly defined as the science of the equation, and the equation has always been its central theme. The application and solution of equations will doubtless continue to receive the major portion of the time and attention of students of algebra. But as the science has developed, the meaning of the term has been broadened; algebra now includes various schemes for dealing, in abstract ways, with many quantitative relations. The abstract and general nature of the methods that characterize the subject prompted Newton to call it universal arithmetic. The glory of algebra is that it furnishes an instrument with which to generalize numerical situations. The abstract nature of the subject, except in some of its more mechanical phases, demands for its appreciative handling at least the mental maturity that we find among pupils of high-school age. For the more brilliant adolescent minds, the convenient symbolism of the science often has a strong appeal; it opens new forms of reasoning, and, when presented psychologically, it gives to the pupils a feeling of increased power because its methods harmonize with and give scope to their rapidly expanding mental powers.

But it is not to be inferred from this view of the subject that all, or nearly all, high-school pupils should study algebra. There has always been sufficient evidence that there are many pupils to whom algebra

does not appeal and whose real needs are better served by other subjects. When we take into account the fact that algebra has been required of nearly all high-school pupils for the last three generations and when we learn from high-school records that it has generally led all subjects except plane geometry in the number of class withdrawals and failures, we are perhaps warranted in the conclusion that the high-school boys and girls of the country have been greatly sinned against in this matter. This conclusion has been reached by many teachers and students of education during the past twenty years. One of the results has been a serious effort to rewrite the textbooks with a view to adapting them to the interests and needs of adolescents and, in some places, to improve and refine the methods of teaching the subject. The inherent difficulties of the subject matter, the present lower level of ability among the pupils of our secondary schools, explained in the first chapter, and the resulting variation in the capacities of the pupils attempting algebra—some of them three or four times as capable as others when measured by the Courtis tests—certainly make imperative the utmost skill on the part of teachers of algebra. As already indicated in another connection, there are two fundamental sources of help: (1) a thorough knowledge of the intellectual nature of the individual pupils and (2) a complete understanding of the ways in which algebra functions in human affairs.

There should naturally be a close connection between the definition of any subject of study and its functions; this we should especially expect as regards any branch of mathematics. As with any other form of mental effort, it is not possible so to state the functions of algebra in terms of life as to set it apart from all other school subjects, especially the other branches of mathematics. This is peculiarly the case when we attempt

a psychological formulation of the functions of any subject, because of the absolute unity of the human mind. We now hold, however, that algebra has for its province certain methods of dealing with human affairs in as abstract a way as possible. Instead of dealing with real cases as such, we learn, in the interest of economy of effort, to get as far away from any specific case as possible. It is an exercise in an extreme form of generalization. As Dr. Judd suggests, "Algebra thus shows itself to be, as in all abstract thought, a most economical mental device. Once we acquire the power to neglect all the concrete facts and to concentrate our attention wholly upon the processes of manipulation, we are free from the incumbrances that come through attention to concrete facts." [1] Algebra furnishes the pupil with a suitable form of expression with which to carry on and set forth in a very abstract manner the complex and sometimes extended number relations involved in his problems. The most exclusive function of algebra is the development of the equation and the exercising of the pupils in its many applications, including large classes of problems that might be solved less conveniently by arithmetic. If the study of algebra fails to establish a clear concept of the equation and to develop skill in its many uses as a mathematical instrument, the work falls far short of its greatest and most characteristic value. As a science, algebra is especially rich in devices for checking and testing the validity of conclusions; thus attention to this phase of the subject tends to establish a scientific attitude toward one's mental performances. Algebra also supplies the pupil with certain devices and uses of language that may be classed as general knowledge, needed both in the ordinary affairs of life and in the pursuit of other school subjects.

[1] Judd, C. H., *Psychology of High-School Subjects*. Ginn.

These are some of the more specific functions of algebra. According to Schultze, it has some qualities in common with geometry. "Algebra requires the same accuracy of thinking, and the same, or possibly greater, accuracy of detail than geometry." "The definiteness of the task" and "the certainty of the results" are "precisely the same as in geometry." [1]

These functions of algebra are here stated for the purpose of serving as guides in our effort to determine the best methods to use in presenting the subject to pupils of high-school age, but we must remember that the interests and capacities of the pupils are the prime considerations in settling all matters pertaining to method. The functions supply the aims; the nature of the pupils must largely determine the ways of best realizing these aims.

II

In the light of what we know about the functions of algebra and the nature of the adolescent intellect, let us examine some of the methods that are usually discussed in books on the teaching of mathematics. The experienced teacher will realize, as these methods are discussed, that they are not by any means mutually exclusive, but that they are applicable to different phases of the teaching process.

1. It is rather common to begin with the analytic, as distinguished from the synthetic, method. In using this method, the pupil is asked to consider carefully the statement of his problem with a view to separating this statement into simpler statements with which he can deal more easily. Analysis may be thought of as the method of discovery. By this method we attempt to account for every step of the mathematical process. After the discoveries are made and each step explained

[1] Schultze, Arthur, *The Teaching of Mathematics in Secondary Schools.* Macmillan.

analytically, the results may be presented and verified synthetically. From this it would appear that the analytic method is the one to be used generally in teaching algebra to high-school pupils; synthetic teaching may well be reserved for advanced college work where it may be assumed that the students are capable of conducting their own analyses.

When we consider the nature of the adolescent intellect and the interests of boys and girls of this age, there can be no doubt concerning the fitness of the analytic method in the teaching of high-school algebra. The attitude of the adolescent is naturally active and aggressive toward anything that promises or seems like discovery. To discover thrills him; to learn often bores him. As contrasted with the preadolescent, he is interested in finding reasons for his ideas; he becomes scientific in his attitude toward his experiences. The fact that the analytic method is informal, often long, and sometimes awkward does not militate against it, provided there is always apparent progress from the known toward the unknown. Although the spirit of algebra teaching should be analytical, there is an important use for the synthetic method. The results obtained analytically may well be arranged and put into permanent shape by a synthetic process. When the proper point is reached for this synthetic, formal summary of results, the high-school pupil finds this part of the work convincing and satisfying; it appeals to him as a clinching process.

An illustration of the analytic method will aid the reader to apply what has been said. Let us suppose that the class is to be taught to solve a complete quadratic equation. The teacher makes sure by testing that the pupils have vividly in mind the form of the square of a binomial. He then selects an equation containing the first and second powers of the unknown quantity.

After being informed that the problem is to find a value or values for the unknown quantity that will satisfy the equation, the pupils are led to analyze what they have in the light of what is desired. They already know how to solve equations containing only the first power of the unknown quantity; hence, if only something could be done to change the given equation into one containing only the first power of the unknown, there would be progress toward a solution. At this point a knowledge of the form of the square of a binomial suggests the next and most important step in the whole process, which is adding such a quantity to both members of the equation as will change the member containing the unknown quantity to a perfect square. The next step in the analysis is evident to all who know why the square has been completed. Of course the teacher understands from the first that this way of solving quadratic equations is not well adapted to the solution of the more complex equations, but that they can be more readily solved by using the formula method, and that this process of completing the square is necessary for obtaining the needed formula. This illustrates, too, how an analytic process may lead to a result—the formula—that may be used synthetically. Normal, curious-minded adolescents would not be satisfied to use the formula in the solution of quadratic equations until they have learned its origin; hence the justification of the analytic method of reasoning.

The solution of a quadratic equation by factoring, a method much used, is a clear and simple application of the analytic process.

The use of the analytic method in formulating the equation needed in solving a problem will again illustrate. "Three men agree to contribute $2100 to a campaign fund, with the understanding that *A* will give twice as much as *B* and that *C* will give twice as

much as *A*." The pupil is led to analyze the complete statement of the problem into three statements: (1) *A*, *B*, and *C* together contribute $2100; (2) *A* contributes twice as much as *B*; (3) *C* contributes twice as much as *A*. Next the pupil selects one statement (the second) to use in symbolizing the unknown quantity; then, by comparisons, he formulates statements concerning the proper formulas with which to represent the other two contributions (*A*'s and *C*'s). Finally he substitutes the three formulas in the first statement and thus obtains the desired equation. This is a method of attack on which there should be much drill.

From these simple illustrations it will appear that the analytic method is a truly algebraic method of thinking.

2. The teacher of algebra, as well as the maker of textbooks, must decide between an inductive and a deductive method of approaching a new topic or a new type of problem. Will the thinking of the class move more readily from the concrete to the abstract, from particular cases to a general rule or principle; or will it be easier to get the thought processes to flow in the opposite direction? If we consult pedagogical theory and practice as expressed in the discussions of the past half-century, we shall find that inductive methods are recommended whenever the educational situation makes it practical. This view finds substantial support in the story of the workings of the human mind from the beginning. Its first movements in any field have invariably been from particular, concrete facts to general truths. This has been known ever since the days of Aristotle, who pointed out the logical and psychological fact that "induction is the source of universal propositions," which in algebra are the rules, the formulas, and the principles. In other words, the inductive method, like the analytical, is the method

of discovery; and as already noted, the alert youth prefers and naturally assumes the attitude of the discoverer rather than that of the learner. Thus the inductive method in a certain sense provides a kind of emotional appeal; but its use is justified chiefly on intellectual grounds. Both experience and observation tell us that the beginner in any field of thought finds it very difficult to see the significance of an abstract or general statement unless preceded by a number of concrete or particular instances.

But this account of inductive reasoning, as applied to the teaching of algebra, does not imply that deductive processes are to be entirely abandoned. On the contrary, the solution of algebraic equations and problems by the use of formulas and rules, if these have been previously demonstrated inductively, is thoroughly pedagogical and appeals to the pupil as a practical and concise method of accomplishing desired results. After the high-school pupil has legitimately come into possession of these convenient rules and formulas and appreciates their significance, should he be required to memorize them? Whatever is simply held in the memory is always in danger of being lost. This suggests one of the many defenses of inductive training, because the pupil so trained will naturally be more likely from habit to think out again the needed formula or rule. Yet the pupil cannot economically stop to work out all needed general propositions; for this reason, the best practice seems to favor memorizing rules and formulas needed in the solution of "all important problems of a fundamental character." Of course, while any formula is in frequent use, there is little danger of forgetting it.

Thus the conclusion is reached that the prevailing method in algebra teaching, especially when approaching a new process or topic, should be inductive, but that, for very practical reasons, the process should

generally continue until it passes into the deductive phase. This statement will be illustrated in connection with classroom technique, which is discussed later in the chapter.

3. In discussions concerning the teaching of mathematics, the psychological method, as opposed to the dogmatic or rigorous method, is usually included. From the point of view of this book, the psychological method alone is of interest. Teachers who are controlled by the ideals of this method take as their standard the average capacity of their pupils, instead of the extreme exactness demanded by pure mathematics as such. Here as elsewhere the only practical guide is the mental development of the pupils. As far as possible, the psychological method "begins with the experience of the learner and develops from that the proper modes of scientific treatment." [1] This is Professor Dewey's way of phrasing the matter; and Schultze correctly insists that "an exactness which is not understood by the student is not exactness so far as he is concerned. Overrigorous teaching will not lead to rigorous thinking." [2] It is true that exactness in thinking and accuracy in expression are among the principal functions of high-school mathematics, but this must always be understood as exactness and accuracy relative to the mental acumen of the pupil. All admit that rigor in the absolute sense of pure mathematics is impossible in the thinking of high-school pupils and, when attempted, the result is adherence to the exact language of the teacher or the textbook, which usually means no thinking, exact or otherwise. When extreme mathematical rigor of statement is demanded, both teacher and pupils are sure to be deceived; for the pupils with effective memories are thought to be good mathemati-

[1] Dewey, John, *Democracy and Education*. Macmillan.
[2] Schultze, Arthur, *op. cit.*

cians; nevertheless, learning perfect models does not produce model thinkers. Since the use of memory when reason is the natural power involved will soon result in a lack of real interest, this is a harmful procedure.

What has been said here concerning standards of accuracy and exactness pertains only to the thinking and the language of the pupils, both of which must be their own; but accuracy may well be demanded in the mechanical phases of the work. Correct results also may profitably be insisted upon in this branch of the work if the difficulty of the thought processes required is adjusted to the ability of the pupils. Mechanical accuracy is an ideal that can be understood by all, and many can be led to appreciate its value.

While the psychological method does not demand absolute rigor in either thought or expression, it does aim to make constant improvement in both, the only limit being the natural one set by the ability of the pupils. This is also the method of the athletic coach who always attempts to train the boy up to the limit of his ability to run, knowing full well that he cannot exceed this limit.

Briefly stated, the psychological method assumes that the distinctive functions of high-school mathematics, as already formulated, will be realized only when the degree of accuracy in both thought and expression is adjusted to the natural capacity of the pupils, rather than to the absolute requirements of an exact science, and when the thinking takes its rise from the experience of the pupils.

4. A recent author of a standard book on the teaching of mathematics says that scarcely any teacher in a secondary school would present algebra in the form of lectures, but that there are teachers who lecture too much. The reader will doubtless agree with this general statement. Because so many teachers are

tempted to tell too much, another method the exact opposite of the lecture method is here described and recommended. In the pedagogy of mathematics it is known as the "heuristic" (find-out) method. The teacher using this method leads the pupils to discover as much as possible. We all understand that high-school pupils are incapable of making discoveries that are really original. The pupils are guided in their thinking by skillfully phrased and arranged questions, and the teacher must be able to frame quickly the question that will lead the pupils to take the next step. Although the class as a group is led step by step through the thought processes, the teacher avoids the so-called "leading question," which seems to characterize the Socratic method, because it is the purpose of this method to maintain an agressive and constructive attitude toward the problem in hand, and this attitude would not be fostered if the answers to the teacher's questions were obvious. The chief merit of the method, when successfully used, is that the pupils are continually and actively coöperating in the discovery of some truth, principle, or process which has been tested and found useful to the race. This is just the opposite of making them the passive recipients of knowledge. J. W. A. Young has vividly suggested the process under the figure of a young child learning to walk. As he toddles across the room, "the teacher stands before him; with word and smile entices him on, selecting the path, choosing every spot where he is to plant his foot, catching him when he stumbles, raising him when he falls, but when he has crossed the room he has done it himself and made more progress toward walking whither he would than if he had been carried across the room and across a hundred rooms." [1]

It must be evident from this account of the heuristic

[1] Young, J. W. A., *The Teaching of Mathematics*. Longmans, Green.

method that its use places high demands upon the teacher, both in the preparation for his work and in the teaching. As Dr. E. H. Hall has expressed it, "the teacher who thinks to let his pupils find out everything for themselves will find out for himself that he has somehow got the hardest part of the undertaking." Like the conjurer, the teacher must in some way make things happen, but for the pupils there is no legerdemain; for them it is a continuous movement of which they are aware toward a result which they understand and value. Otherwise the interest in the performance is lost and the trick is spoiled. Nice discrimination is needed at every step. The teacher is continually judging the difficulty of the next step and the ability of the pupils who are to take it. He must quickly decide when to tell, for this is necessary, and when to question. He must, by reading visible signs, follow closely the thought processes of the class, for this is the only way he can know the thought structure upon which he is building; it is a case of class unity in the highest degree. Insight, resourcefulness, and an alert mind are the qualities demanded for the successful use of this method.

The reader who appreciates the spirit of this method and who agrees with the conception of the adolescent intellect set forth in Chapter II must discern how well this mode of instruction is suited to the high-school pupil. There is a challenge in this system to which his nature joyfully responds.

Are there dangers and disadvantages peculiar to this method besides those others already intimated? It is natural that a teacher who is enthusiastic about the method will expect too much and waste time trying to get from the pupils things that they had better be told. In general, it may be said that the method is naturally slow if judged by the amount of subject

matter covered. Even when used by the most deft teacher, this method cannot be made to lead the pupils to all the results, principles, and processes that they should know. These concessions, together with what has been thus far said concerning the various methods, suggest that the well-equipped teacher will not use any one method to the exclusion of the others, but will employ the one peculiarly suited to his immediate purpose. However, when we consider the heuristic method in its full meaning, it becomes evident that it may include all the others: it is a psychological method, in that it continually calls for a focusing upon the workings of the pupil's mind and a constant drawing upon his experiences; it is generally analytic, as analysis is much needed in making discoveries, but the discussions frequently take a synthetic turn; and it is inductive or deductive according as the exigencies of the work may require, usually inductive, but often ending with a deductive application of the rule, formula, or principle derived.

III

This section is devoted to a few other matters of a general nature that should be briefly considered before passing to the more definite discussions of classroom technique and practice.

The teacher with a highly developed mathematical mind naturally enjoys basing algebraic discussions and operations upon the fundamental laws of the subject, and he derives the nature of algebra from its definitions, not from its applications. He makes rigorous deductions and thinks of algebra as an abstract system of symbols. If this formal view of algebra were allowed to enter the high-school classroom, it would tend to detach the subject from experience and the world of actual affairs. This view of algebra is intellectually

delightful to a few adult minds, but it does not appeal during early or middle adolescence. For the high-school pupil, algebra should be at least partly based on experience; sense-perception should play a part in deriving its fundamental laws; generally this means inductive treatment. The result is that algebra loses much of its possible logic and its satisfying completeness. By surrendering some of its logical perfection, algebra becomes teachable and applicable. From the standpoint of the high school, Schultze is right in maintaining that "applications are the life of mathematics. Without applications it would never have been invented; without applications it would soon be forgotten." "Nobody would care to study a system of symbols which means nothing, which are connected by laws that mean nothing, and which lead to results that mean nothing." [1] The symbols must generally represent numbers that in turn stand for concrete ideas or things, the laws governing the operations must be derived inductively, and the results must return to things, movements, or relations that can be visualized. Thus application must be a distinct phase of algebra teaching in our high schools, for this part of the work gives interest and significance to the subject.

These considerations cause the present writer to believe that the attention which some of our recent textbooks for beginners give to the associative, distributive, and commutative laws and their relation to the fundamental operations is not warranted. These laws and their application have little interest for the beginner; and if the matter is so handled that much seems to depend upon them, the pupils find them confusing instead of helpful. This opinion grows out of the author's experience in supervising student teaching of algebra during the past thirteen years. Mature

[1] *Op. cit.*

people with much mathematical skill got along without these laws, since their very existence was not discovered until the nineteenth century. Strictly considered, this paragraph deals with algebra content rather than method, but the matter mentioned well illustrates a phase that appears fruitless for beginners.

This justification of a realistic handling of algebra, as opposed to the formal treatment, must not give the impression that algebra is fundamentally a concrete science; on the contrary, as already implied in the definitions of algebra, its peculiar advantage as an intellectual tool depends upon its abstract mode of dealing with concrete materials, upon its generalizations which can be applied to particular, practical uses. We may say that generally an algebraic problem or operation should have its roots in experience, and it must weather the test of real situations; yet it often happens that the more abstract and symbolical are the thought processes and manipulations that lead from the concrete conditions to the equally concrete results, the more effective and trustworthy is the method of solution. It is the abstract, logical transition from the concrete conditions of a problem forward to a practical conclusion that gives the science of algebra its efficiency. To profit by the generalizing nature of algebra, we must at times get away from particular cases and consider abstractly how any case or all cases can be dealt with. To illustrate, in the formulation of an equation which expresses symbolically the conditions of a practical problem, the pupil passes from the world of sense perception to the realm of the abstract; then he may with advantage forget all about the concrete origin of his equation and proceed with its solution through many mechanical and detached operations, provided he violates none of the abstract laws of the equation; and his mind thus moves logically, without any disturbing

material considerations, to a value of the abstract symbol with which he represented something very real. Although derived abstractly, this value takes on full meaning and importance because of its concrete setting in the world of the senses. The same principle is illustrated in the derivation and application of all algebraic formulas and in the plotting and the concrete interpretation of graphs.

This statement of the relation between the concrete and the abstract in algebra has been made because of its practical bearing upon the teaching of elementary algebra. Although the adolescent, as compared with the preadolescent, is averse to much mechanical drilling and practice as such, this phase of beginning algebra must receive considerable emphasis if the pupil is to avoid serious handicaps in his higher thinking. To avoid the clogging and befogging of the pupil's reasoning when dealing with the thought processes of a problem, the mechanical processes must become almost habitual; in fact, the so-called higher powers of the mind that are used in problem solving have been designated as "habits organized to work together and selectively . . . a system of connections between situations and responses." But this imperative demand for the mastery of the mechanical processes clearly gives rise to a real pedagogical difficulty; it brings into conflict the thing to be done and the nature of the adolescent who is to do it. The teacher can do at least two things that should aid in overcoming the difficulty here involved: (1) he can motivate the necessary mechanical drill by frequently connecting the work with its practical application, as usableness naturally makes a strong appeal to the adolescent; and (2) he must give serious attention to his methods of drilling on the mechanical operations, seeking the utmost refinement and variety and making all legitimate instinctive appeals. Some-

times flash cards are used for rapid drills on the handling of signs, coefficients, exponents, the simpler operations involved in equation solving, and other brief processes that confuse the pupil unless mastered. Although we must avoid boring the adolescent, drill there must be. Taking the next step in mathematics is usually very easy for the one who is thoroughly skilled in all the preceding steps.

However, this skill must not be treated as an end in itself. Certain phases of algebra yield readily to mechanical treatment; hence the danger of spending too much time and energy on the mechanics of the subject. As far as possible, topics must be treated in such a way as to encourage original thinking; it is only the practical aspects which demand the use of the higher mental powers that make a permanent appeal to adolescents. An appeal to reason as an objective in algebra teaching will find support in the discussions of the topic of the next section.

IV

As already indicated, at first algebra was distinctly the science of the equation; and the equation, with its enriched forms and functions, continues to be the central theme, and, as such, its treatment in teaching deserves special attention. The method of dealing with the equation, as with other subject matter, largely determines the type of mental activity evoked, hence its fitness as an educational implement; that is, the psychological considerations are more important than the logical.

The equation in algebra was first used to find the value of an unknown quantity symbolized in a statement of equality conforming to the conditions of a problem. This was largely its use as presented in what are now referred to as the older algebras. The data

of the problem must be organized in such a way as to indicate what must be done in order to reach a numerical result. The utility of this is manifest in the solution of the equation. The equation also has great value as a concise and convenient means of expressing the relation between quantities that vary either directly or indirectly. The formula that expresses this variation has come to be a very common use of the equation, since nature and the affairs of man are full of relations that can be effectively expressed in this way.

Mathematically, these two uses of the equation appear the same; but psychologically, and that is the point of view of this discussion, the two are very different. According to the first use, the pupil is satisfied only when the equation has been *solved* for the unknown letter and a *value* obtained; according to the second use, the equation is significant to the pupil as soon as he *understands the relation* between two or more quantities, and he is thus enabled to express the value of one symbol in terms of the others.

To pupils of high-school age, the second use of the equation is just as interesting and, on the whole more important to their mental equipment, for, as Thorndike has said, "the understanding of equations as the expression of relations goes straight to the heart of all applied mathematics," clearly setting forth "a rule or law which certain events in nature follow or approximate." [1] This application of the equation places algebra much higher in the opinion of the pupils, and it is a use that exercises powers more likely to be transferred to other abilities. It may be noted in passing that algebra teaching during the last quarter of the nineteenth century, when it was becoming fixed as a first-year study in American high schools, practically ignored the equation as an effective instrument for

[1] Thorndike, E. L., *The Psychology of Algebra.* Macmillan.

expressing quantitative dependence, thus depriving the subject of much of its mathematical and educational value.

To these uses of the equation—solving problems and expressing relations between varying quantities—recent textbooks add a third use. For a long time mathematicians have been very successful in translating all sorts of interesting and useful curves into equations and vice versa; recent books have included this use of the equation under "graphing," which will be briefly discussed later. These three uses of the equation are not really independent and distinct, although the thought relations are closer than the high-school pupil can be expected to realize. From a practical standpoint, they seem very different because of the difference in emphasis; and a serious attempt to teach the *unity* of these uses of the equation would be confusing, whereas the pupils understand and find satisfaction in all these applications of the equation when treated as separate topics.

The purpose of the foregoing statements concerning the uses of the equation is to emphasize its importance in the study and teaching of algebra. Ability to read problems understandingly and organize the data obtained into an equation, together with sufficient manipulative skill for its solution, means success in the subject. Nearly all pupils can acquire some degree of skill in the mechanics of algebra; persistent practice will generally accomplish this. But success in framing equations is a very different type of effort; this ability, as Thorndike asserts, "is very closely correlated with general intelligence of the scholarly type"; [1] it always involves original thinking. Psychologically considered, this is the phase of algebra that is most worth while, and probably develops traits of a kind that can be

[1] Thorndike, E. L., *Psychology of Algebra*. Macmillan.

extended to a large number of other fields, and is thus a valuable educational asset. This implies that the teaching of this part of algebra demands much insight and skill, that is, ability to discern the workings of the pupil's mind and facility in directing his thinking.

If we are to base our method of procedure upon the nature of high-school boys and girls, we must in some way make the pupils feel the need of formulating equations and of understanding the purposes that equations may be made to serve. The dictum, "first the need, then the technique," has been most convincingly set forth by John Dewey. The need and the effectiveness of the equation as a mathematical instrument can be taught by selecting and presenting many simple problems, the conditions of which can be easily, clearly, and concisely represented algebraically in the form of an equation, the equation being merely a sort of shorthand expression of the relations of the quantities set forth in the problem and taking the place of the verbal description of these relations. This should interest the pupil as a new mode of expression and at the same time make an appeal on the ground of utility. The equations used to introduce the pupils to problem solving should be so framed as to read in the order corresponding with the verbal statement of the problem which the equation symbolizes; that is, equations are made to appear as shorthand memoranda of the conditions stated in the problems, the quantity sought being represented by its initial letter and the relations by familiar signs.

Again, nearly all pupils will be aided in applying the equation to the solution of problems if special training is given in careful and adequate reading of problems; experienced teachers know that many pupils are incapable of exact, thought-getting reading of paragraphs. As the problem is read, the data are translated into algebraic language and written down in the form of

suitable equations. This effort to organize the ideas as the pupils read and the attempt to make algebraic notes stimulate exact and adequate reading of the problems is a process that should furnish splendid practice in concentration, as well as valuable practice in forming equations.

This practice in note-taking helps to develop what has been called an algebraic sense. With the same end in view, it is profitable to exercise the pupils in translating algebraically expressed relations into ordinary language. Questions as to the effect of changing the value of one of the quantities in the equation help to stimulate algebraic thinking and develop algebraic sensibilities. A still more elementary drill used for the same purpose is expressing simple quantitative relations with algebraic symbols that do not even form a complete equation. Many of the recent textbooks contain exercises of this elementary kind. It is an attempt to separate and isolate the difficulties, which, if allowed to pile up, will surely swamp the pupils. There is no place in the whole field of education where it is more necessary to begin with the simplest and move very gradually toward the complex. The amount of drill needed before each advance depends upon the natural and acquired ability of the pupils. In the main, the approach to all general expressions and equations should be inductive; and when the generalized form is not understood, there should be an immediate return to specific cases.

The important place of the equation in our educational scheme is summarized in Thorndike's *Psychology of Algebra:* "It is a worthy aim to teach pupils to organize the facts of important situations requiring numerical responses into equation form and to solve these equations. It is also worth while for the pupils to learn that any quantitative question, no matter how

elaborate and intricate, can be so expressed, provided adequate data are given."

V

For several reasons, the formula has come to have an important place in many fields of thought and investigation. When a general truth or law finds expression as a formula, one feels that there is a finality about this way of expressing truth; and if the formula is known to have worth-while applications, there is added a kind of human interest. The formula may be made to serve as a means of transition from arithmetic to algebra, since it is a very important type of literal equation. Because the formula expresses dependence or relationship, it foreshadowed the functional concept in the history of mathematics. By reason of the growing use of the formula as a scientific mode of expression and as an instrument of investigation and because of its value as an educational tool, both teachers of algebra and writers of textbooks are now giving it a much larger place. Since algebra is a science which deals with mathematical relations and operations in a purely abstract way, it is both logical and pedagogical to begin the study of the construction, meaning, and use of the formula in elementary algebra. It is a subject that can easily be adapted to the capacities of high-school pupils, since significant formulas of every degree of complexity are readily available.

In general, it may be said that the mathematical formula and the equation, when used to express relations between a variable and one or more other variables, are closely allied in form and function; and in high-school teaching there need be no attempt to distinguish between the formula and the general equation. Instead of the old-time drill on many meaningless and complicated general or literal equations,

it is much better, for psychological reasons, to confine the work largely to formulas expressing useful relations which can be readily expressed in words and easily understood by the pupils. When genuine formulas are used, pupils of high-school age are naturally interested in both the making and using of these formulas. The making of a formula involves at least two steps: (1) analyzing mathematical processes and rules of procedure, and (2) giving symbolic expression to the results of this analysis. Training in the use of the formula includes two processes: (1) practice in reading, interpreting, and giving verbal expression to symbolical statements, and (2) practice in expressing any one of the variables in terms of the others.

Because of the stage of intellectual development that the high-school pupil has reached, it is very important that real formulas, as distinguished from made-up combinations of symbols, be used; for the adolescent, as has been repeatedly pointed out, is easily interested in discriminating thought processes that are connected with the concrete or the practical. Hence the study of the formula is naturally motivated by showing that it expresses correctly many useful relations, that it generally furnishes a rule for all cases where these relations obtain, that it is often the most concise and telling expression possible, and that it is a splendid way to summarize a complicated thought process. The teaching of this part of algebra has been greatly aided by the increased number of relatively simple formulas applying to the sciences and to practical affairs that are finding their way into elementary textbooks.

Moreover, this study of the formula, which may be made to appeal to many pupils, is regarded by teachers of both the social and the physical sciences as the greatest contribution that the study of algebra makes

toward preparation for these subjects. According to the opinion of thirty-eight of the forty-one college teachers, "prominent in their respective fields," a knowledge of the meaning and use of simple formulas is essential to even elementary work in such fields as astronomy, chemistry, physics, political science, economics, and sociology; the other three consider the ability to evaluate and solve formulas valuable in varying degrees. Reflecting these opinions, the National Committee on Mathematical Requirements proposes as a first college entrance requirement a knowledge of "the meaning, use, and evaluation (including necessary transformations) of simple formulas involving ideas with which the student is familiar and the derivation of such formulas from rules expressed in words."

From the point of view of this book, and as indicated by Thorndike, two cautions should be observed: (1) The pupil must not be unduly burdened with learning the sciences for "the sake of having genuine formulas," and the formulas must not be "complicated with unfamiliar terms" in such a way as to make them unintelligible to the careful reader. (2) If any made-up problems are used, we must avoid "the unrealities and trivialities that have characterized so much problem material of the past."

From the standpoint of the pupils, ability to understand and frame formulas is susceptible of different interpretations, and there has been much discussion as to the degree of ability and skill on the part of the pupils that the high-school teacher should attempt to reach. From the point of view of psychology, it would seem that the symbols used should be understood to represent quantities with definite units of measure that can be expressed in numbers. These symbols need not be labeled; on the contrary, the psychology

of this matter suggests that the manipulation of any particular formula, after it is understood and accepted by the pupils, should be purely mechanical and dealt with in an abstract way. But when the desired result is reached, the pupil's power of interpretation must again be brought into play and the game saved from barrenness by a return to the realm of common sense and practical facts. Anything less than this will not appeal to the adolescent.

In what order shall the various skills connected with the use of the formula be trained? There is yet no agreement as to the best arrangement of topics. The order suggested here is nearly the same as that recommended by Miss Alla Woodyard with the approval of Dr. Thorndike, the difference being an earlier placing of negative numbers. This is the order proposed: formulas containing parentheses or complex fractions, formulas containing negative numbers, formulas with radicals, formulas with abstract quantities, and formulas in which the "subject" is to be changed. Any one who has looked into the matter knows that the order of attack on these various kinds varies greatly. The order of study for any kind of formula is to understand, to evaluate, to make. All agree that the work in each case should begin with simple formulas, easy to understand, evaluate, and formulate.

The educative value of the formula here implied demands that room be made for this work by reducing the time allotted to other topics. Recent discussions are full of suggestions on this point.

In teaching the construction, meaning, and use of the formula, the following is suggested: treat the formula as a shorthand memorandum of relations to be expressed, rules to be followed, or summary of conclusions reached; deal with the symbols contained in the formulas in the same way that numbers would be

manipulated in arithmetic; and give careful attention to understanding the language of the formula, especially the nature of the dependence of one variable upon another.

VI

The graph has in recent years been growing in favor for both statistical and mathematical purposes; and like the formula, it has received increasing attention from makers of textbooks and teachers of algebra. In its use, the mathematical graph is similar to the formula. The one is a graphical or pictorial representation of the relation between variables; the other is an abstract expression of like relations. The graph is a splendid device for picturing the relationship of numbers that, because of conditions, change together; and it is a vivid method of solving problems. The graph and the formula naturally supplement each other. As treated in algebra, the graph has closely related uses: (1) a means of representing dependence, (2) a method of solving problems. When it is desirable to show a whole series of varying relations, the graph can be made very helpful as an illustrative and interpretative instrument.

Because popular discussions of current political, social, industrial, and scientific questions are making abundant use of graphic representation, the meaning and use of this form of expression should be included in our educational scheme. Like the formula, a knowledge of the graph is demanded as an instrument of attack in other school and college subjects. Frequency curves and correlations in biology, sociology, psychology, and pedagogy are given a place in present-day discussions that call for graphic representation, a use almost unknown a generation ago. The essential nature and importance of the graph as a way of repre-

senting statistical data, as a method of representing dependence, and as a satisfying way of solving problems, were emphatically expressed by the vote of prominent college teachers of the social and physical sciences.

But there are stronger reasons, of a psychological nature, for teaching high-school pupils the use of the graph. It furnishes them another mode of expression, something much desired at this time, and it supplies another aid to vivid thinking concerning quantitative relations; both of these uses are stimulating and satisfying and help to meet the intellectual needs of adolescents.

The use of statistical graphs can well be taught in the junior high school or in the upper grades. If taught as part of ninth-grade algebra, not much time need be given to it. The study of this kind of graphing is of sufficient value in itself to warrant its inclusion, and it serves as a natural introduction to the mathematical graph. The forms and the interpretation of the statistical graph may be taught by its application to the growth of population, the cost of living, wind pressure, comparison of two or more magnitudes, and by way of expressing relative frequency. The work is easy, and, because of its concrete nature, the pupils find it interesting.

The mathematical graph justifies its place in elementary algebra by reason of its close relation to the algebraic formula. Both are instruments of analysis and generalization, but the graph better appeals to the eye. As Professor T. P. Nunn has indicated, "it may often be regarded as a general statement from which, as by substitution in the formula, an endless number of new particulars can be deduced"; and it may lead up to a formula, or it may "serve to unfold more fully the implications of a formula whose properties have been only partially explored."[1] As in the

[1] Nunn, T. P., *The Teaching of Algebra.* Longmans, Green.

statistical graph, the concreteness of the mathematical graph makes a strong appeal to high-school pupils; and the use of the Cartesian coördinates has a novelty and unexpectedness about it that often greatly interest and stir the pupils' intellectual curiosity. The relation between the readings of Fahrenheit and Centigrade thermometers takes on much new interest when represented graphically; and great satisfaction is felt when the pupils learn by means of graphs why simultaneous linear equations have one set of roots and equations of higher degrees have more roots.

The best authorities now sanction a graphic treatment of the following topics in algebra: linear equations, simultaneous linear equations, quadratic equations in one unknown, square root, direct and indirect proportion, and the general notion of variation. In each case the work includes the plotting of the curve and its interpretation, and often the solution of a number of problems by reference to the curve obtained. The following statement from Professor Thorndike suggests some of the kinds of material that the high-school teacher may use in teaching the uses of the graph: "Certainly, many of the laws of economic dependency; certain basic notions of continuity and sequence and causation in history; facts of growth versus conditions and composition of soils in agriculture; laws of growth increase in botany; interdependence of animal and plant life in biology; time and rate in interest, and cost-price relations in commercial work; all these might be made clearer to the student by correct and appropriate use of the mathematical graph." [1]

When and how shall the high-school pupil be introduced to the use of the graph? In the algebras of even a generation ago, which treated the equation as something to be solved and nothing more, this question

[1] Thorndike, E. L., *Psychology of Algebra.* Macmillan.

did not arise; and the pupils were safe from the possible confusion incident to the introduction of its graphic representation. When the time came to add the graph as another topic in elementary algebra, both writers of textbooks and teachers did exactly what the logic of the subject demanded. After each aspect of the equation had been studied and the pupils had been drilled in the solution of problems leading to the type of equation under consideration, graphing of this type was introduced as an extension and enrichment; a serious attempt was made to incorporate the concept of the graph in the concept of the equation; and certainly the nature and relation of the two concepts warrant this attempt at assimilation.

Nothing could be more logical and satisfying to a mature and mathematical mind. But the logical and the psychological demands of the situation are not identical. Some of the latest textbooks, keeping closer to the workings of the immature mind, have made a very clear distinction between the equation as an instrument to be used in finding some unknown quantity and the equation or formula as an instrument showing the relation between two or more variables; and it is found easy and natural to introduce the graph as a concrete representation or expression of this dependence of one variable upon another. In other words, the uses of the formula and the graph can better be treated as quite distinct topics after the older use of the equation is well under way. This avoids the confusion of thinking of the symbol representing the unknown quantity as something having only one definite value when found and of conceiving of the symbol as having an endless series of values. For the early adolescent, the two concepts function more easily and with less danger of confusion if kept distinct until the work is nearly completed. After the two ideas of the equa-

tion and the consequent use of graphic representation are fully developed and firmly fixed, their identical phases may be brought to light with safety and perhaps accompanied by a thrill of satisfaction. In the language of the National Committee on Mathematical Requirements, there comes a time in the algebra training of the high-school pupil when "the three concepts, tables, graphs, algebraic formulas, are all representations of the same kind of connection between quantities," and he knows that he "may start in some instances with any of the three." This "is a most valuable addition to the student's mental equipment, and to his control over the quantities with which he will deal in daily life."

VII

It remains to make a few suggestions as to how the time of the recitation period is to be used. It is neither practical nor necessary to attempt to mention all the things that may profitably be done during the forty-five minutes. It is implied in the point of view of this book that no set procedure, however skillfully planned, should be followed day after day; variety of performance is called for by the nature of the human, especially the adolescent, mind. Variety in presentation is one of the ways of overcoming the difficulties inherent in the teaching of beginning algebra, difficulties due to the strange and abstract nature of the materials and processes involved and to the necessity of mastering each step without boring the pupils.

The abstract phases of mathematics are concerned with the relations between the different parts and principles of the subject; the abstractness pertains to its inner aspects. But the teacher of high-school algebra must keep in mind every day that mathematical truths have another side or aspect; as Nunn expresses it,

"they face and have contact with the world of outside relations lying in time and space." [1] The teacher must continually connect with this world if the difficulties due to the new and abstract nature of the subject are to be successfully overcome. As already indicated, the problems or projects should begin with this "world of outside relations," find its solution by the appropriate algebraic tool (equation, formula, or graph), which performs its work mechanically and abstractly, and return to the world of practical affairs. This implies a careful selection of problems, which in general means the use of genuine problems, such as do or might occur in actual situations (not mere puzzles), the data being drawn as far as possible from fields where the pupils already have both knowledge and interest; and it is during the recitation that the teacher must be sure that the pupils conceive of the problems as arising from and returning to the concrete and practical. This assurance is brought about by carefully managed class discussions, which at times make use of all the methods described in the second section of this chapter.

As reported by the National Committee, the Cass Technical High School of Detroit divides a typical mathematics recitation into three parts: (1) checking work, assigning new work, and developing new principles; (2) drill; and (3) supervised study. This plan seems reasonable and comprehensive but rather too general to be helpful to the beginning teacher.

As indicated in this scheme, it is well to begin by taking account of what the class has done with the assigned work, especially any difficulties that have arisen and must be cleared up before further progress can be made. The troubles reported must be dealt with as rapidly as is consistent with clearness, the greatest possible coöperation on the part of the pupils being

[1] *Op. cit.*

secured to enlist the attention of all. Full credit must be given for successful work on the assignment, and often the natural way to give this credit is to call upon the successful members of the class to supply the help needed. They are sometimes able to explain by asking the proper questions instead of by telling. The method in this part of the work should be heuristic, but not to the extent of interfering with the necessary dispatch. While clearing up troubles in class, the stupid pupil must not receive much more than his share of the time, because in the interest of fairness the teacher must guard against boring the class.

If there be any doubt about the amount of time needed to make a proper assignment, the assignment of new work should immediately follow the checking and clearing-up period. The assignment consists of the development of new principles and rules and their application. In algebra, this preparation for the next lesson, whether dealing with principles, exercises, or problems, should usually be worked out inductively and as far as possible heuristically. When introducing new exercises or problems, care should be taken to choose typical cases, using as many of them as is demanded by the capacity of the class. It is never safe, even when making an assignment, to allow the pupils to feel that they are relieved from responsibility; well-directed questions from both teacher and pupils are always in order; the principle of class unity must obtain, and pertinent questions both test and secure it. In algebra the assignment makes certain that the pupils know definitely what they are to do and that they are supplied with sufficient data to enable them to do it. This calls for both insight and judgment on the part of the teacher. To give too much help encourages loafing and leaves the pupils without enough incentive to stimulate wholesome effort. To give too little help

is disheartening and produces the same result as hitching an untrained colt to a load it cannot move. The teacher, too, must learn by experience with each class how much he can rely on the explanations given in the text; and as the year advances, the amount of help given the class should decrease.

When the class moves to the consideration of the assigned lesson, approved ways of proceeding are numerous. The purposes of this part of the algebra recitation are to test preparation, supply needed drill, enrich the work when possible, and in general discover the mental needs of individual pupils by learning the way their minds respond in the presence of algebraic difficulties. When the lesson has been well prepared, only a little time is needed for the oral discussion of technical terms and the statement and explanation of principles. In dealing with assigned exercises and problems too difficult for oral treatment, it is generally best to make much use of blackboards. This gives an opportunity for all to inspect the work, and it affords the publicity which the adolescent naturally desires for his successful efforts. When the recitation period is so managed as to omit board work, high-school pupils often ask that they be allowed to "work at the board." When the work at the board is for drill, as much variety as possible should be introduced. Sometimes all should do the same work at the same time. Sometimes the class should work in groups secured by rapid numbering on the part of the pupils. Sometimes each pupil should have his own exercise. Sometimes the whole class should be sent to the board, and sometimes part should work at their seats. This kind of work usually calls for little or no explanation. When troublesome exercises or problems have been placed on the board, explanations should generally be demanded only for one of the following reasons: (1) ex-

planations needed by part of the class should be given by pupils who can do the work effectively; (2) pupils concerning whose work the teacher is in doubt should be called upon to explain and submit to criticism. If only a few of the pupils at the board are in need of help, it would seem to be the function of the teacher to give individual help or delegate the work to a pupil; but if many are in need of assistance, it is in the interest of economy of time and effort, as well as of class unity and control, to ask all the pupils, or at least all that are having trouble, to stop their work and give attention to needed instruction. This general instruction should pertain to what all are needing, because, if each step has been taken carefully and the work has been thorough, the trouble will involve only the present step which they are trying to take. When only part of the class is sent to the board, there should be work ready for those at the seats. This may consist of oral drills of various kinds, reviews, or written work similar to the work going on at the board. If the pupils at the seats are asked to do written work, there should be some kind of a check on the work. Otherwise carelessness will result.

The whole subject of supervised study has of late been very much discussed and the technique carefully worked out. Regardless of whether this be part of the regular plan, it would seem a sensible procedure to have the pupils go on with new work whenever there is time after the planned work of the recitation is completed. Algebra appears to be a subject well suited to the methods of supervised study.

In teaching a subject like algebra, one is in continual danger of forgetting that boys and girls are controlled largely by instincts and emotions, instead of by intellect. This danger is always present in teaching a subject in which so much time and energy must be

given to practice on mechanical manipulations and so much thought directed toward abstract considerations. Let the reader again be reminded that the verb "teach" takes two accusatives. If we are to appeal to the pupils on a human basis, the work must be so managed that the pupils will consider it worth while on the ground of present values, rather than merely on that of the benefit it will be in other subjects and in after life. It is quite possible, also, for many pupils to be brought to view algebra as Professor Thorndike sees it; that is, that its main service is to teach them to "frame general rules for operating so as to secure answers to *any* problem of a certain sort, and express these rules with admirable brevity and clearness by literal symbolism." [1]

[1] *Psychology of Algebra.*

CHAPTER VI

GEOMETRY

I

For the adult, especially if he is mathematically minded, the discovery of correlations between algebra and geometry gives great satisfaction. The harmony between these distinct sciences helps to supply a philosophical want; the intellectual adult is always thrilled with any evidence of the unity of all knowledge. The satisfaction frequently seems to vary directly with the unexpectedness of the relations revealed; algebra and geometry, being well-defined and distinct sciences, naturally do not lead the student to anticipate many points of real contact. The instances of contact between the two subjects, therefore, appear very important to the mature mind. This is doubtless one of the reasons why there is so much discussion concerning combined courses and why from time to time there have been serious efforts to fuse or correlate high-school algebra and geometry and teach the two as one subject. There may be good reasons for teaching them at the same time, and it is certainly interesting, pedagogical, and profitable to emphasize the few points at which the two subjects reveal the same mathematical principle or truth; but no arrangement of subject matter and no method of treatment can make a unified science of two branches of knowledge that deal with concepts fundamentally different. Algebra has for its function the consideration and manipulation of quantities or generalized numbers and their relations, and geometry

has to do with space relations and deals chiefly with form and magnitude. Number and space are distinct categories and are so understood by boys and girls of high-school age. From the standpoint of method, the distinct character of these two branches seems to demand separate treatment, hence the need of this chapter on the teaching of geometry.

It would appear from the experience of many high schools that geometry, like algebra, is a comparatively difficult subject. Dr. Judd's study of the records of eleven high schools near Chicago reveals over fifteen per cent withdrawals and over eighteen per cent failures in plane geometry. This is probably typical of high-school work throughout the country, and if so, geometry, as indicated by Dr. Judd's table, is the most difficult high-school subject taught. Many of the regular propositions demand a rigorous deductive form of proof that seems to be too difficult for pupils whose ability places them in the lowest quartile; at any rate, geometry as taught does not make a strong appeal to these pupils. This should mean that, if geometry is to be retained in our program of studies, we must in fairness to our high-school pupils give much attention both to the selection and to the presentation of subject matter. This chapter is mainly concerned with the manner of presentation.

As in the case of other subjects, the method of teaching geometry should be determined by a consideration of (1) the interests and abilities of the pupils who attend our high schools and (2) the nature of the subject matter, including the part that it is believed to play in the intellectual and practical life of the world. The point of view of this book makes these the determining considerations in all matters pertaining to method.

II

First, what is the nature and the function of geometry? As already indicated, it is concerned with forms and spatial relations. The forms and spatial relations under consideration are represented to the eye by means of figures; hence there would appear to be a concreteness about geometry that is lacking in many phases of algebra. The concreteness is more apparent than real, however, since each figure is only one of thousands that might have been used and stands as a type rather than a representation of a definite individual portion of surface or space. In other words, geometry, like algebra, deals with general ideas and concepts. This being the case, demonstrative geometry has the inherent difficulties for the immature mind that are involved in the consideration of abstract or general truths.

Furthermore, Professor Judd has shown that "the recognition of space is a complex psychological process which develops in the course of individual contact with the world, especially through movements in the world. Space is not a form of sensation and is not dependent on any single group of sensations. It is a relational type of consciousness." [1] Although the development of our concept of space and its relations is a complex process, space relations when viewed in the concrete and represented by a carefully measured figure do not seem to present great difficulties for the normal adolescent; many relations appear obvious. But Euclidean geometry undertakes to analyze and compare forms and relations which are represented by figures, and this "involves higher forms of consciousness than those which are cultivated in the perception of form and distance." [1] That is, scientific analysis and comparison is a very different matter from mere perception. Our

[1] Judd, Charles H., *Psychology of High-School Subjects*. Ginn.

space perception by means of analysis and comparison has been "refined and clarified," and we have as a result the elaborate science of geometry. This much seems to be fundamental concerning the nature of geometry.

In general, geometry is less mechanical than algebra; and since its subject matter is made up largely of proofs, it has a refined logic of its own which must be mastered. The reasoning is of a high grade, the arguments proceed in an orderly way, and the truth of the proposition is always established beyond a doubt. There is abundant opportunity for originality and ingenuity on the part of the individual thinker, and memory plays a minor but important part. All this extremely logical procedure is concerned with space relations and magnitudes.

When we read the discussions concerning the purpose of geometry in our scheme of secondary education, we find a great variety of opinions among the experts; however, it is important that we should reach a somewhat definite understanding as to why we continue the subject in nearly all our high-school curricula; the purpose must help to determine both the content and the method. Frequently the aims are classified as practical, disciplinary, and cultural. Although these three uses of geometry are far from being mutually exclusive, this classification will serve our purpose as well as any.

1. It has been difficult for the enthusiastic students and teachers of geometry to believe that the study has little direct practical value for the individual. They know that they have received great satisfaction from its pursuit, and they feel certain that it has been very helpful to them in many ways, in both of which contentions they are doubtless correct. However, a close analysis of the results of teaching geometry and a careful

classification of these results relative to their *direct* uses in the ordinary affairs of life lead to the conclusion that the utilitarian elements of the subject are comparatively meager. Even D. E. Smith, one of the greatest and most enthusiastic teachers of geometry, does not claim a place for it in our high schools on the ground of immediate utility. All of the geometrical "facts that a skilled mechanic or an engineer would ever need could be taught in a few lessons." Arthur Schultze asserts that its true end is power, not knowledge. The *Report of the National Committee on Mathematical Requirements* mentions among the practical aims of geometry "familiarity with the geometric forms common in nature, industry, and life"; a knowledge of these forms, including their elementary properties and the applications as taught in mensuration, is certainly of value, but the pupils do not need to pursue a complete course in demonstrative geometry in order to know their meaning and use. The report also mentions "the development of sense-perception" and "the exercise of spatial imagination," both of which are decidedly worthy aims but hardly to be classed with the directly useful. It must be admitted, too, that the contributions of geometry to the higher branches of mathematics and to the sciences are not so great as has often been claimed.

2. When we consider the disciplinary function of geometry, we find the defenders of this ancient and long-perfected science have a worthy case, and this notwithstanding all the experiments and discussions tending to destroy our faith in the old theory of formal discipline. The present view with regard to the doctrine of mental discipline turns quite largely on a definition. Many recent writers have dropped the term "formal discipline." They maintain with little contradiction that mental habits, traits, prejudices,

attitudes, dispositions, and ideals developed in one field of intellectual effort may be "transferred" to another related field or situation. During the past few years, educational psychologists have found it much easier to come to an agreement concerning the transfer of acquired abilities than they did fifteen or twenty years ago. Thus "general mental discipline" may now be considered a valid aim in education, and the teaching must be done in such a manner as to make the results of training in one subject transferable to another subject or setting.

One of the latest and most important statements of agreement concerning this matter of transfer or spread is in the *Report of the Committee on the Reorganization of Mathematics in Secondary Education*. Because of its direct bearing on our discussion of the disciplinary function of geometry, the reader should have before him the united opinions of the twenty-seven psychologists as expressed in their responses to the committee. Only such portions of this report are given as apply to the present discussion. "Transfer of training is an established fact, and may be positive, negative, or zero." "It is a reasonable inference that a substantial amount of transfer to some related field would be found by an adequate test," provided in our teaching "emphasis were placed upon the trait which the selected subject was most capable of developing, and if the factors controlling transfer were present in the training." Thus it would appear that the aggregate transfer in each case depends largely upon the method used in presenting the subject. This will be considered later. If by experiment it should be found that even "small amounts of transfer of the valuable trait" are extended to "a large number of fields, the sum total of all these small amounts would be a very valuable educational asset." "There are elements of a situation

so fundamental in their nature that they occur again and again in connection with anything else. Special training with these elements has genuine value." It appears to be the belief of nearly all the experts expressing themselves in the report that transfer is most certain and most evident with respect to *general* elements and that "these act in many instances as the carriers in transfer." It is also important for teachers of geometry to know that "meaning, method of attack, and attitudes are more transferable than skills and facts of information."

These are the opinions of many of the leading authorities on educational psychology. What, then, are the desirable traits, habits, powers, dispositions, attitudes, and ideals that the proper study of geometry will develop; and what are the probabilities of transfer to other subjects and fields of activity? How much geometrical experience can be generalized? This would seem to depend upon the kind of mental activity that the pursuit of the subject calls forth, in other words, upon the phases of the mind that are most frequently and most vigorously exercised in geometrical demonstrations.

Whatever may be true of other high-school subjects, it has never been disputed that the mastery of an ordinary demonstration in geometry demands of the pupils certain very definite kinds of effort; if successful, the effort must be vigorous, it must be orderly, it must be thoroughgoing, it must be sustained, and it must be a mental effort directed in accordance with the laws of deductive reasoning. No pupil can follow, much less originate, geometrical proof, when his mind is woolgathering, when he is slovenly in his thinking or his statements, when his constructive imagination is dormant, when he is flighty or careless, or when he is incoherent in his mental movements. In other words, geometry is a thought-compelling subject,

demanding that the pupil be mentally at his best; it stimulates and makes for intellectual robustness. Moreover, the pupil is here dealing with a well-defined body of subject matter; he is thinking about it in terms of relationships; he is in contact with absolute truth; he is becoming familiar with the verities of the universe, and all this is mentally uplifting. On the side of expression, the language of geometry tends to fix high ideals. It is free from ambiguity; it is as concise as possible, having been perfected and polished through the centuries; it is orderly and accurately expresses the closest thought sequences; and it has a simplicity and cogency of style that grows out of the logical nature of the thoughts expressed. Can these qualities of thought and expression that are exercised by the study of geometry be transferred to other fields? Will the habits here formed be carried over into other situations? Will the intellectual ideals here developed function in other settings? In other words, do the statements of the psychologists concerning transfer apply? The answers to these questions are conditional and will be considered in connection with classroom technique.

3. The cultural aims or purposes of geometry, as generally set forth, may be stated briefly. They are perhaps less tangible but just as important. They include "the appreciation of intellectual unity and beauty," "ideals of perfection as to logical structure, precision of statement and thought," "discrimination between the true and the false," and the "heart-felt joy" that comes from the contemplation of a harmonious body of truth, all clearly and logically presented.

III

When all questions pertaining to the method of presentation are decided, the interests, needs, and capacities of the pupils in our geometry classes are

much more important than the functions of geometry in the life of the ordinary individual. The adolescent intellect and its development in general were described in Chapter II. Is there anything further that applies especially to the teaching of geometry? If there is, it must be something definite concerning the development of the adolescent's power to do the kind of reasoning called for in geometrical proof.

It will be recalled that many studies of school children have been made which tend to prove that before puberty their forms of effective reasoning are confined pretty largely to their experience and their immediate environment. This type of reasoning is not adequate for the demands of demonstrative geometry. It is naturally tentative, incidental, and intermittent. Moreover, the preadolescent does not readily formulate the results of his reasoning. Clearly the interests and intellectual needs of the preadolescent preclude the study of geometry unless it be some form of constructive geometry. As G. S. Hall has often told us, if rigid logical methods are employed too early, they "tend to stultify and violate the law that fundamentals must always precede accessory structures and functions." [1] Preadolescence is the time for mechanical accuracy and skill in manipulation. The processes readily become effectively automatic.

With adolescence there gradually comes more interest and ability in the logical and scientific processes. In this stage of development, interest and attention are naturally transferred to principles and theories based upon the accumulations of past experience. "Now inasmuch as the mind and body economize their respective and correlative types of energy by deliberate attention to one activity at a time, and find it therefore difficult, or even impossible, to attend to two processes

[1] *Op. cit.*

equally and simultaneously, we should in general, from observation of our own nature and that of others, expect some diminution in the rapidity of growth of technical mastery when the logical stage is reached." [1] This statement by Branford was amply supported by his study of more than seven thousand pupils in thirty English schools. He found a distinct tendency in a majority of the pupils toward a drop in the curve of accuracy at some point during the period of puberty. The stage of development at which this decrease in accuracy occurs varies, and there were cases where no diminution was discovered. In six schools where the average age of the boys was approximately fifteen, the curve of accuracy dropped to its lowest point, a decline in the growth of accuracy being manifest before the age of fifteen was reached. An experienced English master says that "at this age it is the taller boys, rapidly growing, that fall off, but the little chaps remain steady." The drop in accuracy in the girls' schools was found in general to occur between fourteen and fifteen. Roughly speaking, the highest points of accuracy were near the beginning and the end of secondary-school life; and the drop, if it occurred, was always between. There were many cases of pupils, especially boys, who appeared to have "gone to pieces" during the mid-period, but "found themselves again later."

During adolescence, as Branford describes it, "emphasis passes normally from sense and sense-sprung intelligence of the world without to feeling and feeling-sprung intelligence of the world within, so that meditative intelligence takes on a new color. The intellect and judgment based at first largely on sense, now repose on feeling. . . . The soul is beginning to discover its own new and inner self. At this stage lively emotion

[1] Branford, Benchara, *Mathematical Education.* Clarendon Press, Oxford.

and formal logic are not cold antipathies in the hands of a sympathetic and sane teacher, but natural allies: geometrical truth has its own compelling beauty." The rapid development of individuality at this time includes a growing questioning attitude, one of the essentials of mathematical ability; and there often appears a passionate fondness for the logical and the systematic in thought and design. In the earlier stages of mathematics concrete and intuitional methods are successful—nor should they ever be dispensed with entirely,—but now "the systematizing and rationalizing age has patently begun." Energy is naturally transferred and focused on principles, logical thought structures, and "the whole paraphernalia of rationale."[1]

What do these characteristics of the adolescent intellect signify when applied to the mathematical part of our high-school curriculum? They seem at least to *imply* that it would be well to arrange matters in such a way that the mechanical and manipulative technique of first-year algebra, which constitutes such a large part of the subject, may be taught before the drop in the curve of accuracy occurs, and that those phases of algebra which require the higher thought processes—for example, the formulation of equations expressing conditions involved in the more difficult problems—be delayed until the mental emphasis has shifted to logical and scientific interests. It certainly seems to imply that the work in demonstrative geometry is not due psychologically until the adolescent's interest in system, design, and logical processes is clearly manifest; for a majority of the pupils, this stage of development begins during the drop in the curve of accuracy and progresses rather rapidly during the second and third years in the senior high school. It

[1] *Ibid.*

is at this time that many a youth becomes a "willing disciple to the sovereign law of reason."

However, when the more logical aspects of algebra are attempted, and when geometry, with its closely reasoned steps arranged in an orderly fashion in the form of deductive proof, is presented, constant *application* of the derived truths and principles must not be neglected; for there is always a stimulating reciprocity between thinking and doing, and the doing in this case involves mechanical accuracy. The psychological implication is that the emphasis must shift from time to time between internal thought and external application; the two processes are mutually and helpfully interactive. These seem to be the implications of adolescent psychology as to the content and timing of our secondary-school mathematics.

The suggestiveness of all psychology when applied to method is even more definite and significant. Thus far in our discussion two criteria have emerged for our guidance: (1) the adolescent's ability to reason, just described, and his growing interest in the thought processes, and (2) the latest statements of the psychologists, already outlined, relative to the amount and kind of acquired mental traits that may be expected to transfer under favorable conditions. The first guiding principle is dictated by the viewpoint of this book; the second is determined by what we believe to be the chief functions of geometry. These two criteria are to be applied in all that follows, for they fix the point of view that controls instruction.

Fortunately our highest authorities now practically agree that the amount and kind of transfer largely depend on how the subject is taught; half of the psychologists who replied to the questions of the committee on mathematical requirements volunteered statements to this effect. "The real problem of transfer," accord-

ing to Dr. Judd, "is a problem of so organizing training that it will carry over in the minds of the students into other fields. . . . Mathematics as a subject cannot be described in my judgment as sure to transfer. All depends upon the way in which the subject is handled." [1] A majority of the experts expressed the belief that transfer or spread of improved efficiency is a valid aim in all teaching. If this is assumed with regard to teaching in general, and if the functions of geometry have been adequately stated, it follows that the bringing about of a transfer of desirable mental traits is the chief aim in teaching the subject.

What, then, are the elements that must be introduced into our teaching of geometry in order to make sure that it fulfills its disciplinary function? In the light of educational psychology in general and adolescent psychology in particular, the following are some of the considerations that cannot be ignored.

1. Many experiments, as well as our knowledge of the youthful intellect obtained in other ways, lead to the conclusion that the more objective and concrete we make the relations between the geometrical deductions and the practical purposes these deductions may serve, the more certain we are that the methods and standards of reasoning employed will spread into other fields. This involves the principle of motivation.

2. In order to ensure the largest amount of transfer, there must be maintained a high level of attention. It is only by securing concentration of a high type that the pupil can be brought to appreciate the method of procedure as such. In its workings, this principle corresponds to the associative law of voluntary attention. The explanation on the physical side, to quote James, is that "the amount of activity at any point in the brain-cortex" is proportionate to the intensity of

[1] *Report by the National Committee on Mathematical Requirements.*

the excitement. To maintain the kind of attention needed to secure the desired transfer demands skillful teaching based on insight.

3. According to R. S. Woodworth and other psychologists, concentration upon the subject matter in general is not sufficient. "To guarantee any transfer, the element to be transferred must be brought specifically to the pupil's attention, generalized into a principle, and the application of the principle to other fields made clear." [1] In other words, the specific activities to be transferred must be made the *object of thought*, and these activities must be given practice in other situations. In the interest of economy, the emphasis in teaching should be placed upon those traits and processes which the subject is most capable of developing. In geometry it is the method of attacking and proving and the standards of reasoning that we wish to have function in other situations. Thus the pupil must be made continually conscious of these methods and standards which prevail in the reasoning process that constitutes real proof; that is, there must be training in such technique of geometrical reasoning as will apply in other fields. An account of the technique of geometric proof will be found later in the chapter.

4. In stating the law of association of ideas, psychologists always include the law of repetition, which is a matter of common observation and experience. In the study of transfer, a corresponding law has been found; it is to the effect that any traits that are repeatedly exercised in any subject of study are likely to spread to other fields; that is, practice with knowledge leads to transfer. In the case of geometry these traits, as already indicated, are believed to include the habit of orderly procedure, the habit of giving a valid reason for one's statements, the ideal of clear and con-

[1] *Report by the National Committee on Mathematical Requirements.*

cise expression, and care in the use of connecting words. For all these, geometrical reasoning furnishes daily practice, with increasing probability of transfer.

5. Professor Bagley holds that the spirit of instruction and training is an all-important factor in the fulfillment of the disciplinary functions. When we speak of the *spirit* of anything, we are using rather vague language; yet every one realizes that something vital and important is referred to. Although it has not been proved, there is little doubt that when the spirit of instruction is wholesome, the desirable traits involved in the study of the subject will tend to find their way into other lines of effort.

6. Carefully conducted experiments show that one of the concomitants which is operative in bringing about transfer is a "conviction of the worthwhileness of the training" on the part of the pupils. As E. C. Sanford observed, "This, of course, does not mean that the test will be merely a vocational one—though that factor will be a large one—but whether the student when he has completed the course feels that he has gotten something worth while out of it. This value may be something quite non-utilitarian. I can imagine a teacher of mathematics so enthusiastic himself for the subject and so skillful in presenting it that his classes would be largely attended even under a system of free election by students who had no further 'use' for mathematics in mind." In recent years there has been a growing tendency to insist that a high-school subject must "stand or fall on what it itself can do in its own right";[1] but this tendency does not run counter to the doctrine of transfer. Whatever the cause of the enthusiasm on the part of the teacher and the pupils, zeal ensures transfer. This contention finds much support when viewed in the light of what we know of

[1] *Report by the National Committee on Mathematical Requirements.*

adolescent ardor and enthusiasm. Youthful earnestness and devotion, especially when the imagination is enlisted, is a splendid medium in which to develop and make *permanent* all sorts of desirable traits; and these traits stand a much greater chance of future functioning if they have had their birth amid the glow of youthful intellectual enthusiams; hence the precept, "cultivate emotional attitudes."

7. As Bagley maintains, ideals developed in connection with any kind of intellectual effort act as carriers in transfer; like ideas, they supply the "common element," which is the indispensable condition. Only a slight knowledge of adolescence is needed to suggest the effectiveness of ideals and the facility with which they may be developed when dealing with high-school pupils; it has been said that "the chief business of adolescence is the formation and projection of ideals." [1] Fortunately these ideals constitute the motive power of much youthful endeavor; and it is suggestive that the ideals formed during adolescence are easily emotionalized and thus tend to become dynamic and effective in action. According to Bagley, "Ideals that lack the emotional coloring are simply intellectual propositions and have little directive force upon conduct." Thus the forming and fostering of intellectual ideals, as proposed in the teaching of geometry, is "both an emotional and an intellectual process"[2]; and it is argued that "the emotional force necessary to vitalize the ideal is most effectively furnished by a course that is coherent and logically arranged, and thus provides an esthetic appeal." The ideals of orderly procedure, closely reasoned conclusions, and clear and concise statements, which we aim to realize in geometry, cannot be developed and cher-

[1] Slaughter, J. W., *The Adolescent.* George Allen and Unwin, London.
[2] Bagley, William C., *The Educative Process.* Macmillan.

ished by much talking about the matter; but they do come by persistent and constant emphasis on the qualities that constitute the desired ideals, care being taken not to push the emphasis beyond the limit fixed by the capacities of the individual pupils. This is the only way an ideal can be built, since ideals rest ultimately on experience and may be thought of as "an important type of condensed experience." In the case of geometry, it is a *series* of thought experiences that we believe will have a cumulative effect. In brief, the teacher of geometry aims at "ideals of procedure."

These seven principles affecting transfer apply to and make for economy in the teaching of any school subject, but they are especially worthy of consideration in the teaching of geometry if its chief functions have been correctly formulated; the chief functions being disciplinary, we must be governed in our method of presentation by every consideration that aids in the fulfillment of these functions.

IV

Since the method of attack in geometry is highly important, both teacher and pupils should frequently focus upon the approved modes of procedure. The following are some of the principal methods that have long been used in geometrical proof. Through inductive presentation, the pupils should be made familiar with these methods for the purpose of furnishing them with the intellectual tools needed for independent thinking and to ensure the desired transfer to other situations.

1. The synthetic method of attacking the proof of a geometrical proposition is the one most likely to be tried first. By this method the pupil directs his attention to known axioms, postulates, and former propositions, and from these he selects what is needed to build up a proof of the proposition in hand or a con-

struction for the problem to be solved. This is the most direct method of attacking any problem, and it is the method that the world has long used. When we prove that intersecting straight lines form equal vertical angles, we use the synthetic method. Many textbooks begin with this proposition; and the proof is made to depend upon one of the properties of supplementary angles, a postulate ("straight angles are equal"), and an axiom ("when equals are subtracted from equals the results are equal").

As compared with other methods of proof, the synthetic method may seem less scientific, a sort of wandering about, a hit-or-miss way of doing; but for its successful use, the pupil must appreciate what he has learned and be able to exercise discrimination in choosing and applying knowledge to his present need. It demands an attitude of mind and a sense of values that we do well to cultivate. It is a method of thinking that has enabled man to do many practical things, for example, to measure the width of a stream that cannot be crossed.

2. The analytic method, said to have been invented by Plato, has the advantage of being systematic; it, too, is applicable to both proofs and solutions. Analysis is primarily a method of discovery. The pupil begins by getting clearly and firmly in mind the proposition to be proved. Then he proceeds to discover another proposition on the truth of which the given proposition depends. He then finds that this discovered proposition depends upon still another proposition. Finally he reaches a proposition which he is able to prove. He then reverses the whole process step by step. The truth of each proposition, beginning with the last, enables him to establish the truth of each preceding proposition and so on till the original proposition is reached. This method of proof has several forms. In dealing with the solution of geometrical problems,

the pupil assumes that the problem is solved and thus discovers the results that follow; then, as in the case of proving a proposition, he reverses the process and tries to attain these results. Pupils may well form the habit of trying this method when they fail to see any other way of starting a proof or solution. When a way has been found analytically, the proof or construction takes the synthetic form.

To illustrate the analytic method, it is best to begin with an easy and clear case. When sufficient data have been mastered, we may ask the pupils to find a way of proving that the mid-point of the hypotenuse of a right triangle is equally distant from the three vertices. This must be true if a line joining the mid-point and the vertex of the right triangle is equal to half the hypotenuse. These must be equal if a line drawn from the mid-point of the hypotenuse perpendicular to a side bisects this side. This it does, because it is parallel to the other side. Since this perpendicular bisects the side, we have oblique lines drawn from the same point in the perpendicular and cutting off equal distances from its foot; hence the oblique lines (half the hypotenuse and the line joining the mid-point to the vertex) are equal. We may now reverse the process and establish synthetically the truth that the mid-point of the hypotenuse is equidistant from the vertices of the triangle. By analysis we learn that a proposition can be proved, and by synthesis we prove it.

3. The indirect method is sometimes thought of as the last resort when seeking the proof of a proposition. According to this method we assume that the proposition is false, then proceed to prove that this assumption cannot be true. There are three methods of indirect attack; the third does not conform to the above definition. (1) We may prove that the assumed proposition leads to an absurdity, *reductio ad absurdum;* (2) we may

show that any proposition that is inconsistent with the given proposition cannot be true, a special form of *reductio ad absurdum;* or (3) we may draw a line that meets the required conditions, then prove that the given line in question coincides with this line.

The first method of indirect proof may be used conveniently to prove that the perpendiculars drawn from the sides of an acute angle cannot inclose a right angle. This we do by assuming that the perpendiculars do inclose a right angle; then we show that this assumption leads to the absurdity of a quadrilateral the sum of whose angles is less than four right angles. The second method of indirect attack is used to prove that the sides opposite the unequal angles of a triangle are unequal. The third line of indirect proof may be used to prove the equality of alternate interior angles formed by a transversal cutting parallel lines. We begin by drawing a line that makes equal angles, then prove that this line coincides with one of the parallel lines. When first introduced to this method of proof, the pupils do not like it and generally find it troublesome. Sometimes considerable experience is needed to reconcile them.

4. All textbooks use to a limited extent proof by superposition. There are theoretical objections to this form of proof; but it is the only practical proof for certain propositions, such as those that pertain to the congruency of triangles. The success of the method depends upon imagining one figure placed upon another and proving that they must coincide. This seems more like a geometrical device than geometrical reasoning, and we should expect the amount of transfer from this method to be very small.

5. The algebraic method is commonly used to prove certain properties and to establish certain truths relative to geometric figures. In this method a letter is used

to represent an unknown line segment, angle, or surface; an equation (or two simultaneous equations), depending upon certain known geometrical relations, is formed; and the equation is solved for the desired value by algebraic methods. This is a method frequently used in proving and computing the numerical properties of geometrical figures, for example, in computing the area of a triangle in terms of the sides. At first pupils are reluctant to use this method, probably because it departs during part of the proof from the concrete. However, the pupils come to see its manifest advantages for certain types of propositions; and its frequent introduction has the cumulative effect of unifying geometry and algebra at a few points.

Since the amount of transfer is dependent upon the method of teaching and the degree to which the pupils become conscious and appreciative of this method, it would seem best to draw attention frequently to the particular method used in proof or solution, always applying its appropriate name. In the earlier phases of instruction, the pupils need much experience and training as to methods of attack, rather than extreme emphasis on rigid logic. As Dewey suggests, "The logical, from the standpoint of subject matter, represents the goal, the last term of training, not the point of departure." [1] As Kline maintains, it is at first primarily not a question of good mathematics so much as a question of adaptation to the mental development of the pupils. If, as the proof progresses, questions are raised and the various possibilities as to method are discussed, the interest of the pupils in method as such will increase, and they will naturally become eager to attack propositions on their own account. At any rate, the immediate aim of the work is always the securing of interest in geometry and its appropriate methods.

[1] *Op. cit.*

The adolescent naturally enjoys adding to his logical equipment, since each new method promises more scope for his developing powers; he comes to find satisfaction in realizing that he is always in the presence of an ordered and continuous system of logical deduction; and this state of mind is highly favorable to transfer.

V

According to the returns from a questionnaire sent to high schools in various parts of the country, seventy-five per cent of the pupils like original propositions least, the principal cause of this aversion being that they are thought to be too difficult. Yet, if our statement of the functions of geometry is correct, it implies that successful independent effort put forth on this part of the subject is the most profitable. This suggests the need of a high degree of skill in directing the efforts of the pupils.

All writers on the subject are agreed that there is no rule or method that can be prescribed for the solving of originals; if this were possible, the work would lose much of its originality and hence its value. The success of the pupil in this part of geometry depends upon (1) the amount and the clearness of geometrical data that he holds in mind, (2) his ability in making a mental inventory of these data, (3) his power in evaluating this material relative to his present needs, and (4) his logical skill in marshaling this selected material—definitions, axioms, postulates, former propositions—for the purpose of proof. In order to ensure some degree of success with original exercises, we must make certain by reviews, or some other means, that the pupils have the necessary data consciously in mind; we must by comment and discussion lead them to evaluate these data; and we must, by making them familiar with the

methods of geometry, develop power in geometrical reasoning.

In doing all this the teacher will find his difficulties greatly enhanced by the marked individual variations which characterize the class before him. Yet one who has gone through the experience successfully, either as a pupil or teacher, comes to feel "the power of thought, the magic of the mind"; and it would be difficult to persuade him that he has not grown in the power to reason vigorously and that he has not thereby added to his mental stature. One's feelings in this matter do not constitute mathematical proof, but it is the kind of proof on which nine-tenths of our practical decisions are based; in the case of the student of geometry, he has his faith in the efficacy of his efforts made strong by repeated assurance that the methods and technique which he is using and perfecting are leading him to the vantage ground of absolute truth; and this assurance in itself makes the methods and the technique seem interesting and significant, and thus, according to well-known laws of psychology, the chances for transfer to other useful fields are increased. The independent student of geometry, like the religious enthusiast, believes that he has inward proof that his efforts are neither vain nor fleeting, and this attitude furnishes a large part of the emotional setting which helps to transform his belief into reality.

To be helpful, instruction must be specific and often include matters of detail. An accurately drawn figure frequently suggests a proof or a solution. The figure should be generalized enough to guard against suggesting a special case. Emphasis should be placed on the importance of the pupil's holding in his mind's eye what is given, in order that he shall look constantly in the right direction for available foundations on which to build his proof; and it is just as important

that the pupil shall be continually aware of what he is to prove or do, that his efforts may be directed toward the proper goal, and that he may not fall into the common error of "begging the question." Frequently an orderly statement of the evident implications of what is given and what the figure reveals proves very suggestive as to what should be the first line of attack. In reviewing his data with a view to finding what there is that can be used in dealing with the case in hand, the pupil should form the habit of confining his search to the particular group of former propositions that the nature of the case suggests; for example, if he wishes to establish the equality of certain angles, he should consider only such given conditions as determine the equality of angles, which may be alternate or corresponding angles of parallel lines, base angles of an isosceles triangle, corresponding angles of congruent triangles, or opposite angles of a parallelogram. This is in the interest of economy of effort and to aid the pupil in evaluating and selecting the material for his proof. The pupil's skill in arranging his material in such a way as to establish the truth of the given proposition is a matter of both natural ability and experience. It is the teacher's function to see to it that the experience is purposeful; this can be done generally by encouraging the use of the approved methods already described. Modern psychology teaches that the more abundant, the more varied, and the more purposeful the experience, the more resourceful we may expect our pupils to be in their efforts at independent thinking.

The foregoing suggestions relative to ways of attacking geometrical solutions and proofs may give the impression that the matter is comparatively simple and can be controlled by an adept teacher; but such is not the case, as any one may learn by experience or by a close scrutiny of what is really involved in geometrical

reasoning. Geometry is the work of adult philosophers, and it was intended for their use. In this type of reasoning, the pupil is not dealing with causal necessity, as in the natural sciences; but he is dealing always with "logical necessity," which, as such, exists only for the mind. When we are trying to get our pupils to pass in their thinking from one geometrical truth to another, until they finally reach the truth to be established, we are attempting to get them to practice a form of inference which has no test of its validity except the avoidance of mental self-contradiction; whereas in many of the other high-school subjects the thought connections are causal and may be proved by observation, experimentation, or reference to invariable rules of sequence. Although geometrical reasoning is concerned chiefly with forms and magnitudes involving space relations, it does not depend upon actual measurements and is therefore abstract and for many a very difficult type of thinking. Although, like other reasoning, there is a selecting and a recombining of the result of past experiences, these experiences rest merely on logical necessity; and for the immature mind this sometimes means much trouble. Some of the difficulty may be avoided or overcome by using such exercises and materials as are employed in constructive or concrete geometry. The materials and methods of constructive geometry are needed in some cases as aids to visualization, and visualization serves as a guide to reason. Sometimes the difficulties encountered in geometrical demonstrations are of such a nature and the rules of procedure are so far to seek that the teacher's part seems to be reduced merely to stimulating the pupils to continued effort and to guiding them at times in the recognition and selection of usable material, which it is hoped they will be able to combine in a way leading to proof.

VI

It remains to discuss classroom procedure. It would be misleading and harmful to give the impression in this connection that there is any stereotyped way of conducting a recitation in geometry. If a teacher were to develop and to practice continually a fixed form of procedure in geometry, "all the personal magnetism of the teacher, all the enthusiasm, all the originality, all the spirit of the class, would depart, and we should have a dull, dry mechanism. . . . The experience of the school has shown that a few great principles stand out as generally accepted, but as to the carrying out of these principles there can be no definite rules." [1] This is the opinion of one of the greatest American teachers of the subject. This must be true, both because of the nature of the teaching process involved, in which group reasoning predominates, and because of the changing needs of the individual pupils. Moreover, there must be a constant adjustment to the varying character of the subject matter. Thus there is no predetermined best way of using the class period.

However, because of the purpose of the recitation, as set forth in Chapter III, and because of the relation of the teacher to the work of the individual pupils which grows out of this purpose, there are a few things that should receive attention nearly every time the class meets, although the order in which these matters are considered and the division of time cannot be fixed. Yet the teacher should introduce enough system into his work so that no essential part will be neglected. What, then, are some of the essential parts of a geometry recitation?

1. There should be opportunity for clearing up difficulties. This part of the business should be done

[1] Smith, D. E., *The Teaching of Geometry*. Ginn.

rather briskly and with as little direct telling on the part of the teacher as is consistent with economy of time. If class unity is to be maintained, the class must form the habit of coöperating in this part of the work; and this calls for teaching skill. The members of the class who have overcome the difficulties of the assignment soon become proficient in diagnosing troubles and in asking the kind of questions needed to point the way, and this they enjoy. Responsibility in this matter is not usually spontaneous, but it can be developed. Care at this point is necessary to prevent mere dawdling; overdoing in the helping period naturally encourages a supine and dependent attitude toward the lesson assignment. The teacher should insist on good questions, since good questions require considerable knowledge of the subject under consideration. Very often the troubles reported by the pupils can best be cleared up in connection with the regular class work. This economizes time, gives more unity to the work, and hence is better technique. The success of the question period depends largely on the spirit manifested. The questions must be sincere and grow out of real effort on the part of the questioners; and the treatment, although brisk, should be sympathetic. This part of the recitation can well be "socialized."

2. For various reasons it is best at times to require written work. This may be a test on a definite unit of work covered, solutions and demonstrations of originals prepared outside of the class, a portion of the day's assignment used to test preparation and train in form and neatness, or notebook work. Only a small amount of class time should be used in calling attention to common weaknesses and failures and in emphasizing the good points in the best work. Names may be mentioned in discussing the most worthy efforts; the pupils should be asked to evaluate unusual work.

Class discussion of written work emphasizes its importance and conserves time.

3. As to the recitation proper, many good forms of procedure might be recommended. Unless the proof is largely of an algebraic type, or unless it is especially difficult to follow, for many reasons it is best to have placed on the blackboards only the necessary figures; during the first few weeks, it is well to have a carefully written statement of what is given and what is required. This part of the recitation should cover the advance propositions and as many review propositions as time will permit. In general the recitation will be more interesting if different work is assigned to all who work at the boards. The figures should be put on rapidly; much of the drawing can be done free-hand; neatness in drawing and lettering should be insisted upon. The assignments of board work are made, with books closed, by quoting the proposition at least in part, then calling the name of the pupil. While the figures are being placed on the boards, a small amount of written work may be done by the pupils at their seats, some phase of the work that is of interest but not essential may be discussed, or some historical or practical phase of the lesson may be considered. When the figures are ready, oral demonstrations begin with the advance propositions, the pupils demonstrating at the board, pointer in hand, and all attending to the proof. This part of the recitation may well be rather formal; correct habits of thought and speech will be more likely to result, and the pupils will respect the orderly procedure. The common order is a general statement of the proposition, an explanation of the figure, a specific statement of what is given and what is to be proved, then the proof and the conclusion reached. If the proof is long or complicated, it is an advantage to have a brief general statement of the plan to be

used in proving the proposition; this aids the class in following the proof, and it is somewhat of an index to the pupil's appreciation of what he is doing. Although it is unorthodox to advise it, the pupil demonstrating can save time and facilitate thinking, as he moves through the proof, by omitting the usual reading of lines and angles, and simply pointing accurately to the part of the figure that he wishes to indicate.

There is lack of agreement as to whether reasons for statements should be given before or after the statement; to the present author it appears that the reasons, briefly stated, should follow. The arguments for and against this opinion will readily occur to the reader.

The members of the class must be held responsible for the success of the proof and be ready at any time to go on with it or supply the suggestion or question needed when trouble arises. Much judgment on the part of the teacher is necessary to know how much time should be allowed the pupil reciting; there is always a delicate balance to be struck between individual and group welfare, and the principle of individual differences is at all times involved. In the case of timid pupils tact is needed to get them through a demonstration. If there is clear evidence of lack of preparation, it is wholesome to let the pupil take his seat and allow a well-prepared pupil to finish the proof. The nature of the mistakes must determine whether criticism should come immediately or at the end of the demonstration. Often questions and discussion should follow the proof for the purpose of finding out whether the work is the result of reason or memory. Almost any method that encourages and develops reasoning is good, and when reason should do the work, any method that fosters the use of memory is very bad. High-school pupils in their second or third year are ready to reason, and geometry is the subject *par excellence* for

the exercise of reason. Both the function of geometry, as already formulated, and the intellectual development of middle adolescence call for an appeal to the spatial imagination and to reason rather than to memory.

In connection with many proofs there should be discussion and evaluation of the method used, with a view to making the pupils conscious of method as such, and with the hope that they will be able to carry the method over to the proof of originals. Discussion and attempts at evaluation tend to inculcate norms and ideals of close thinking and precise expression. These norms and ideals must be a matter of growth, and constant practice under proper stimulation leads to growth.

If the proof is difficult to follow, or if it involves the manipulation of equations, proportions, or complex formulas, part of the work should be written on the board when the figure is drawn, or the pupil may talk and write at the same time; when the latter method is used, it gives the impression of mastery, the class easily follows the demonstration, and the pupil demonstrating receives splendid training in thinking, talking, and writing at the same time.

By way of variety and for the purpose of training in group thinking and responsibility, the whole class may coöperate in giving the proof, the teacher using the pointer and acting as chairman of the proceedings. It has been the author's practice to use this method with the first few propositions, with a view to developing the meaning of proof. But this form of procedure fails to bring the benefits that come from fixing individual responsibility for the success of the entire proof, and consequently there is less opportunity for sustained individual effort.

4. The assignment of the next lesson is an important part of every class meeting in all subjects. The assign-

ment may come at the end of the class period if the teacher is certain how much time will be required and if he is able to prevent other matters from encroaching on the time. The character of the assignment depends upon whether the lesson is to be devoted to definitions and other preliminaries, regular fundamental theorems with the proof in the textbook, or original exercises.

When the purpose of the lesson is to introduce new terms or other preparatory matter, carefully worded, thought-compelling questions should be included in the assignment, questions of such a nature that their answers may not be furnished ready-made but which can be thought out from the data found in the book assignment. Sometimes the assignment should call for outside material illustrative of the ideas presented in the book. This kind of assignment improves both the teaching and the pupils' preparation.

When the lesson is to be devoted to the mastery of regular proofs and constructions, the nature of the assignment will be determined by the ability of the class and the difficulties involved in the work. If the proofs are easy and the pupils are capable, very little is needed beyond a brief comment or discussion to whet their appetites for their work. If the proofs are long and involve several steps or if they are complicated, there should be a discussion of the general plan of the proof, supplying a sort of bird's-eye view of the path over which the reasoning must travel, and attention should be called to the chief objectives or turning points in the proof. Occasionally questions can be so framed as to stimulate thinking and guard against an undue use of memory. Stimulate thinking and discourage memory.

When the efforts of the class are to be applied to original work, much care and discrimination are needed to avoid discouragement on the one hand and to bring forth the best efforts of the pupils on the other hand.

Sometimes the necessary figure may be suggested; sometimes a few questions which point the direction but do not suggest the proof may be asked; sometimes a practical application of the proposition may be made; sometimes the best method of attack (using the technical name) may be suggested; sometimes one or more pivotal questions about that which is required may start a fruitful train of thought; or sometimes a little expanding and emphasizing of the essentials in the statement of the proposition is all that is needed. Very frequently a good assignment includes the process of vivifying the geometrical experiences of the pupils which throw light on their new task or which furnish the necessary data. In the language of Herbart, it is a stirring of the suitable apperceptive mass; it is directing attention to the old material out of which the pupils are to make the new syntheses. It is only the teacher of insight that knows how much and how little of this kind of preparation he should furnish his pupils.

The method of presentation and the technique of the recitation are both decidedly important to the success of classroom procedure, but far more vital than either of these is the spirit or atmosphere that is developed and maintained during the class period. As Dr. G. S. Hall insists, not only the drill of preadolescence must be steadily relaxed, but new appeals must be made to freedom and interest and reason. "We must lead and inspire if we would avoid arrest. Individuality must have a longer tether. There must be evolved and fostered a spirit of questioning, investigation, exploration, testing results, and independent thinking. The avenues of intellectual integrity must now be kept open. The adolescent naturally has a horror for anything that smacks of inertness, apathy, or boredom. Thought and feeling must alternate; for, although

reason now appears in its theoretical and critical form, youth cannot live by thought alone." [1] Slaughter often reminds us that "the central fact of adolescence is emotional change." [2] All this, when translated into terms of the classroom, means that there must be great variety of method, a rapid interplay of thought, an appeal to the constructive imagination, vigorous concentration on the matter in hand, a focusing on thought content sometimes to the neglect of mere form, a spirit of dash and adventure, a quick recognition of promising suggestions and clews, and an atmosphere of intellectual goodfellowship in which the give-and-take of free discussion is often present.

If this chapter aids the reader by increasing his skill in the teaching of an ancient and difficult subject and if it adds to his enthusiasm for the ideals exemplified, its purpose has been realized.

[1] *Op. cit.* [2] *Op. cit.*

CHAPTER VII

SCIENCE

I

At present nearly all high schools are offering courses in general science, physical geography, botany, zoölogy, physiology and hygiene, chemistry, and physics, or the equivalent of these under other names. More than a generation ago, when the older sciences were rapidly finding their places in the program of studies, students of secondary education felt and expressed the greatest confidence in their effectiveness as educational material. Modern industries, initiated and fostered by the rapid developments in nearly all fields of science, were successfully mastering the material world and making human existence easier and more enjoyable; and it was natural to infer that further industrial and economic progress depended largely upon the training that the schools and colleges were able to give in the use of scientific methods and that this training would result from teaching the various sciences. There was much popular interest in every phase of scientific discovery and application, and this interest was taken as conclusive proof that the facts, principles, theories, and methods of science would win the attention and hold the interest of adolescent boys and girls in our high schools. But the prevailing optimism as to both practical results and real interest has not been justified by the experience of the secondary schools of the country during the last quarter of a century. The practice of allowing high-school pupils considerable

freedom in choosing their subjects has enlightened us concerning the things in our curricula which interest them most; and the judgments of the industrial world and the colleges into which high-school graduates have gone furnish evidence relative to the effects of high-school science teaching. The verdicts have been discouraging. The records show that, during the period that pupils have been free to choose, there has been a steady decrease in the percentage of pupils electing the older sciences; and in the meantime, the leaders in the industrial pursuits that have a scientific basis inform us that the high-school graduate is unable to apply either scientific knowledge or scientific method to his work, and the colleges assure us that high-school graduates are not able to do scientific thinking.

Where is the trouble? What is the cause of all this disappointment? Thus far there has been no complete explanation, nor is there likely to be one very soon, since the whole philosophy of education is involved. It is not a matter of discovering the cause, but rather of understanding causes which include subject content, mental attitudes, and teaching methods.

In the first place, as Dr. Judd has pointed out, "the scientific attitude of mind is by no means a simple attitude"; consequently it is not readily assumed by the immature thinker. "It was long generations before the mind was disciplined to carry out those elaborate and carefully guarded forms of thought which constitute modern science." [1] The educational leaders who were most enthusiastic and confident concerning the effects of science teaching doubtless expected too much. Dr. C. W. Eliot and others argued for science on the ground that it naturally demands a close correlation of brain, eye, and hand, and is thus highly favorable to practical developments; in the pursuit of the modern

[1] *Op. cit.*

sciences, "the whole nervous system, the memory, and the discriminating judgment are at work together"; hence stronger mental action and reaction result. This seemed good psychology; yet, as we know, the actual results of teaching science in our secondary schools do not accord with this line of reasoning.

In the second place, when we infer that the alarming falling off in the enrollment of classes in some of our high-school sciences is due to a lack of interest, we do not take into account all the influences involved. Many new subjects have been added to our program of studies. During the five years between 1910 and 1915, the number taking agriculture increased fifty-four per cent, and the increase in home economics was two hundred and forty-one per cent; doubtless this increase accounts for part of the falling off in the older sciences. Then, too, many of the other new subjects, with their vocational bias, have been recruited at least partly from the pupils who might otherwise have found their way into the science classes. In other words, the older sciences have encountered vigorous competition, and the falling off has many causes besides lack of interest.

In the third place, we were never warranted in assuming that the interest of adolescents in the things around them furnishes a natural basis for scientific study. Careful attention to the psychology involved proves that this interest is prompted largely by natural curiosity rather than by a truly scientific attitude; a scientific attitude in nearly all cases, as will appear later, is something that must be developed.

Finally, much of the criticism that has come from the industrial occupations has been unfair in that it has been based on the assumption that scientific thinking and practical skill applied to the results of scientific thinking are identical. As Dr. Judd insists, these are

often "the most diverse aspects of mental development." Our captains of industry, too, have expected too much.

However, after due allowances are made, the situation is disappointing; although the sciences have been of great practical value to the race, they have not functioned in the lives of many individuals. Again the question, why has science teaching not been more fruitful? Is it because of the subject matter selected, the age of the pupils taught, or the methods used?

The sciences have been rapidly developed and organized by men of brilliant and logical minds. As the sciences have grown, there has been evolved an exceedingly significant technical nomenclature which fairly bristles with classical names. The use of an appropriate Greek and Latin vocabulary has resulted in logical and intellectually satisfying classifications. All this imposing methodology has been very helpful and necessary to the growth and effectiveness of the sciences, and it has made a strong intellectual appeal to logically minded adults, adding momentum to their efforts in the interest of both pure and applied science. When it was decided to add the sciences to our high-school curricula, it was natural, at any rate easy, to transplant all this beautifully logical organization and much of its accompanying technique in a somewhat diluted form to our high schools; at all events, that is what happened. As a result, on the unprotected high-school boys and girls were foisted many scientific facts, principles, and theories, logically organized and presented, but with little or no heed given to the psychological demands of the situation. As Hall says, it was "the logical order before its time making havoc with the genetic order." [1] The result was a deadening of natural curiosity and a dehumanizing of the subject

[1] *Op. cit.*

matter, because the logically devised systems of classification and thoroughly adequate nomenclature were often, for even the most capable pupils, merely strange sounding words and generalizations with nothing from which to generalize. It was truly absurd to expect boys and girls in their teens to tingle with emotion over those logically worked-out principles and systems.

What, then, is the natural approach to this marvelous body of interesting and useful knowledge?

During the years of childhood and preadolescence, the various natural phenomena are taken without question at what appears their face value; they are dealt with on a pragmatic basis; and they are superficially interesting, not because of the perception of unfolding laws, but because they satisfy curiosity and are often found personally useful.

But with pubescence comes another kind of interest. Dr. Hall, whose dictum held sway during the first decade of the century, assures us that, "of all the changes normal at adolescence, none are more comprehensive and perhaps none are more typical of the psychic transformation of this age than those that occur in the attitude toward the various aspects of nature. Love and enthusiasm for nature, if it is ever to arise, is now in order." [1] The poet agrees:

> *The Youth, who daily farther from the east*
> *Must travel, still is Nature's Priest.*

It would seem, then, that our only assurance of success in this matter of passing on this rich scientific heritage is a thorough knowledge of this comprehensive change of attitude toward nature; and with this knowledge as a guide, we must select and present the facts and principles of the sciences in accordance with the interests and needs due to this changed attitude.

[1] *Op. cit.*

Hall's thesis that pupils during early adolescence "normally approach any and every branch of science over the same road which the race traversed in a prescientific age" [1] is neither tenable nor practical. He contends that "nature is sentiment before it becomes idea or formula or utility." Perhaps, but this sentiment is not science; and it does not lead to science, however important it may be as a basis for poetical appreciation. Yet Hall has said things to which the best recent authorities on teaching science assent: "The nature of youth demands that science should be taught at first in a large, all-comprehensive way." [1] This means that we must touch rather lightly some of "the great hypotheses, frontier questions, and larger syntheses." . . . "in a way that the modern specialist wots not of," in a way "that is unitary, synthetic, and non-analytic." Although the everyday applications of science do not logically come first, they do "precede in the order of growth and interest the knowledge of laws, forms, and abstractions"; extreme "thoroughness and perfection violate the laws of youthful nature and growth." [1] During the questioning age, the adolescent seeks answers that are brief and suggestive, rather than those that are thoroughgoing, quantitatively proved, and reducible to formulas; and with copious, well-chosen information the teachers should stir the imagination, "for this is the organ of the heart and opens up the way for reason."

If high-school pupils are not naturally interested in scientific terms and their definitions, if the intensive, analytical, and quantitative methods of the specialist are beyond them, and if the splendid logical organization of all the significant facts and principles does not appeal to them, what does the psychology of youth suggest as to material and method? The adolescent's

[1] *Ibid.*

new attitude toward the various aspects of his natural environment suggests that we must begin with the concrete, but this is not a new or untried doctrine. His rapidly developing reasoning powers, to which attention has often been called, suggest the wisdom of beginning with facts and conditions that give rise to simple problems, for in problems his evolving faculties find exercise, and he rejoices in his new-found strength. But problem teaching is not a modern invention. The adolescent's strong desire to get behind the scenes and learn how and why things work indicates that physical causes and explanations should be sought; but it has always been the chief function of the sciences to explain, and they frequently explain their explanations.

II

When we attempted to discover the methods best suited to the teaching of high-school mathematics, it was decided that there are at least two legitimate criteria: (1) the nature of the pupils and (2) the functions of the subject. The same guides are of use in determining methods of procedure in the teaching of the high-school sciences. Let us proceed, then, to a statement of the purposes of science teaching as worked out by advanced scholars and the teachers of the secondary sciences. They may be classed as specific habits, methods, attitudes, ideals, and organized knowledge.

The mental habits include accurate and unprejudiced observation, careful investigation and experimentation, cautious interpretation, scientific thinking, thinking in terms of the universal, hunting causes, testing and verifying results and hypotheses, and seeking practical applications of laws and principles.

The methods are, in general, those practiced in the pursuit of scientific knowledge. They are not, as

nearly all writers seem to think, the methods dictated by strictly logical formula; logical formulas represent the goal instead of the means and serve as guides in the formulation of results after the discovery is made or the problem solved. Cut-and-dried thinking, of course, is not fruitful. The working methods developed by scientific pursuits are intuitive rather than rigidly logical; they are slowly built up by concentration and practice and are too varied and elusive to be crystallized into fixed formulas.

The mental and emotional attitude resulting from scientific pursuits may be designated as open-mindedness, readiness to accept on a practical basis what has been proved, problem seeking, enthusiasm for scientific laws and reasons as opposed to authority, and patience in the search for truth. Out of scientific study comes an attitude of alertness and an aversion to the superficial, a tendency to see relations rather than mere things and a delight in following truth wherever it may lead.

The ideals, or what Bagley calls "emotionalized standards," that are initiated and developed by the study of science are extremely vital when one deals with adolescents. The chief business of adolescence, according to Slaughter, is "the formation and projection of ideals." These ideals include intellectual integrity, sincerity, and consistency. All teachers of science hope that these ideals will be carried over into other fields of endeavor.

It must be apparent that, if the sciences function as habits, methods, attitudes, and ideals, they really function as a mode of living, a way of seeing one's environment and reacting to it. It is profitable, as Bobbitt suggests, to look upon science "as active living experience rather than as an embalmed thing ready for the memory vaults. . . . The width and complexity of the science program should be dictated

by the width and nature of man's environment." [1] Subjectively, this environment varies with each individual pupil. If scientific habits, methods, attitudes, and ideals are established early in the life of our pupils, the ultimate result should be "a vision of the whole range of reality"; and it is only in the light of the whole that we can see the parts of nature in their proper perspective, hence, correctly and fruitfully.

The organized body of knowledge gained through the study of the sciences has usually been considered the most important and useful part of the results. As will appear later, its importance and value depend largely upon how it is acquired. However, for the practical affairs of life, it is generally agreed that this organized knowledge should include an understanding of many mechanical appliances, the chemistry of common things, the simpler principles of physical well-being, the science involved in the home and its premises, the standards and some of the cost elements in the various forms of public service, and all coöperative activities in the interest of the public good. So it seems that scientific knowledge should mean a reconstructed environment resulting from the pupil's efforts to unify experience, a new mental picture of natural phenomena with greatly improved perspective and parts better correlated, and an appreciative understanding of the chief laws, principles, and hypotheses which are indispensable in unifying and explaining and making usable the knowledge of our natural surroundings.

At the risk of being thought old-fashioned, we may add to these functions others that should be classed as disciplinary: namely, an improved sense of values, a more vigorous constructive imagination (a most fruitful mental attribute), the power to do sustained,

[1] Bobbitt, Franklin, *How to Make a Curriculum.* Houghton Mifflin.

consistent, and critical thinking, and the ability to generalize and to formulate general statements.

These are some of the functions. Perhaps it would be better to say they are the *purposes* of science teaching in the high school, the benefits at which we *aim*. At any rate, it is certain the spirit of science and its attitudes and ideals, which constitute the most permanent and significant returns, cannot be imparted to high-school pupils by teaching them certain facts, laws, and principles; these things, like any worth-while acquisitions, come only as the result of growth and development; the center of effort is always the pupil; for him, as Dr. Morrison says, the essence of education is "to set him going under his own power." [1]

The remainder of this chapter is concerned with methods that should aid the teacher of science to realize, so far as the nature and capacity of his pupils permit, the functions here set forth.

III

Our studies of the adolescent mind and the aims and purposes of teaching science force the conclusion that all real education in science must take its rise from the individual pupil's observation and experience. Long ago Emerson taught that the meanings of words and ideas must, in the last analysis, rest on things that can be perceived by the senses. But if we are actually to begin with the pupil's observation and experience, we must begin with rather commonplace phenomena. Hence two difficulties at once arise: (1) no two pupils have exactly the same experiences, and (2) generally, the everyday and ordinary occurrences of life cease to be interesting, familiarity frequently breeding contempt. The first difficulty involves the principle of individual

[1] Morrison, Henry C., *Teaching Technique of Secondary Schools*. University of Chicago Press.

differences, a principle operating in all classroom teaching; in this instance, care must be exercised at the beginning to choose natural phenomena which cannot have escaped the notice of many.

In discussing the second difficulty, William James says: "It is an odd circumstance that neither the old nor the new, by itself, is interesting: the absolutely old is insipid; the absolutely new makes no appeal." But this difficulty must be promptly overcome, for the adolescent will not be bored, and no one really thinks concerning matters that fail to interest. Quoting again from James, "The genius of the interesting teacher consists in sympathetic divination of the sort of material with which the pupil's mind is likely to be already spontaneously engaged, and in the ingenuity which discovers paths of connection from that material to the matters to be newly learned." This is an important step. Unless the teacher is able to take it successfully, he cannot really teach science. At this point it is the teacher's function to lead the pupils to see that there is a real, worth-while problem involved in the familiar phenomena chosen for study. The problem must be one that they can appreciate, and it should be so presented as to introduce some aspect of novelty. To meet the first requirement, the solution of the problem raised must not involve extremely long and complicated lines of reasoning. Interest can be stimulated if the problematic situation, as developed with the pupils, includes some form of seeming incongruity or contradiction, as, for example, the fact that vegetable sap and heated air and liquid rise against the force of gravity. Even if the natural manifestations under consideration do not involve an apparent incongruity, the scientific point of view which unifies and harmonizes seemingly unconnected and inconsistent facts, as distinguished from the "common-sense" view of the matter, carries

with it a sense of novelty and hence appeals to the pupils' intellectual curiosity. The interest will be greater and the efforts at solution more intense if the principle involved can be applied to industry or some other useful activity, because the adolescent's social outlook is widening and includes human welfare.

This is the second step in science teaching and one that demands as much skill and technique as the teacher can muster. Vast knowledge is not sufficient; it is largely a question of method. By apt questions, fruitful suggestions, and sometimes vivid descriptions or stimulating preliminary experiments, a problematic situation is unfolded on the basis of familiar concrete materials. The more the pupils are led to contribute to the formulation of the problems, the greater will be their interest and effort. The amount of independent thinking done by the pupils is a natural measure of the teacher's success; and when skillfully managed, the successes of the various pupils appeal to all the worthy social instincts which are now maturing so rapidly.

The next step is the solution of the problem which has been discovered and formulated by the coöperative efforts of the class. If real knowledge, that is, knowledge which includes ability and skill in its application, is to be the result, the burden of finding solutions must be placed largely upon the individual pupils; many and varied are the devices and expedients that they will sometimes resort to in thinking their way through; but there must be no short-circuiting of the thought connections by an undue use of memory on the part of the pupils. The solution may call repeatedly for further observation, laboratory experiments and tests, oral discussions and questionings, and much sustained thinking on a concrete basis, thinking in which other apparently related phenomena are brought together

with a view to shedding light on the present case, the teacher in the meantime standing by encouraging, criticizing, and questioning the moves made by the pupils; for he must not allow an "anarchy of idle and irresponsible opinions" to become habitual. It is a splendid game in which all genuine effort will win something.

The foregoing account assumes that much practice in solving scientific problems is the only way whereby pupils can gain a really usable knowledge of the facts, laws, and principles of their natural surroundings; the aim is a method of thinking, an attitude of mind. Moreover, if we are true to our modern psychology, which tells us that we must appeal to the whole nature of our pupils, this problem solving must include motor as well as mental experiences. It must also be so managed as to stir the imagination, and, through the successful and vigorous use of thought and imagination, to create an emotional setting, without which the normal youth is not greatly impressed. In fact, it is the emotional overtone in everything that the brain does which gives to life its color and significance; it is the source of all the glow and enthusiasm which accompanies human effort; it is characteristic of the adolescent and the genius. The reader will note, too, that, if we are faithful to the demands of adolescent nature, we ensure the greatest amount of transfer of scientific knowledge and method to other fields of activity, the method and the conditions being the same as those set forth in connection with the transfer of skill, knowledge, and methods gained in the study of mathematics. This is but another way of saying that the knowledge and methods gained are usable and practical.

So much has the principle involving the creation of a problematic situation dominated recent educational thought, that an old word of Latin origin, "project,"

has been seized upon, redefined, and made to do service as a technical term. It emphasizes the educational importance of *purposeful* experiences. The project first made its appearance in connection with vocational education; then the teachers of science found in it a unifying principle. Whatever value the project may have as an educational method, the abundant literature that has grown up around the term is imbued with the scientific spirit and is full of suggestive ideals. The proponents of project teaching make much of the purpose which determines, guides, and dominates the educational process; the purpose furnishes the inner motivation. The aim is reflective thinking. The project attempts to identify education and life by the character of its motivation and the methods which it encourages. Although the project has a technique of its own, its advocates resent the notion that there is any such thing as a cut-and-dried project. "Organization of subject matter," according to Woodhull, "must be around the knowledge of the pupil." [1] Moreover, the project seeks to select and capitalize race experiences in the interest of human expression and development. All this seems to harmonize with the intent and modes of modern science teaching. As used in recent educational discussions, the term "project" appears to be broader in its scope than "problem" as used by teachers of the sciences. Professor W. H. Kilpatrick considers the problem one of the four types of the project. However, there would be little difficulty in showing that the other three types of projects, when the purpose is to make something, to enjoy and appreciate something, or to acquire some kind of knowledge or skill, are likely to be important by-products of a well-planned and vigorously investigated problem. This brief statement indicates the suggestiveness of

[1] Woodhull, John Francis, *The Teaching of Science*. Macmillan.

the project method. At its best it provides for an ideal psychological organization.

It must be understood that the consistent use of projects and problematic situations and the constant drawing upon the pupils' immediate environment and the experiences of their everyday life do not in the least militate against closely organized courses in the special sciences; and no implication relative to courses in general science is intended. It would be very unfortunate if anything less than closely woven and systematically arranged courses in the sciences should emerge from our efforts at reconstruction. We have already had too many compilations of detached and scrappy information posing as textbooks in science. Such collections of unconnected and undigested information never establish any scientific principles or develop any scientific methods, and they will never give the pupils any adequate conception of *organization* in the true biological sense. There is no reason why the logical demands of any science as embodied in the best efforts at book making should not largely determine the content of the course and the general order of procedure, provided always that the teacher, in choosing and organizing his materials (drawn as far as possible from the pupils' environment) and in developing his methods of presentation, is inspired and guided by the interests and the intellectual and social needs of the pupils. Although the teacher has always in mind a closely organized and systematically arranged body of facts, principles, laws, and theories, he does not bewilder his pupils by spreading before them the condensed results of all the mature observation, experimentation, and thinking that has thus far been done. But the good teacher does gradually build up in the mind of his pupils the logically worked out body of knowledge which we call science; this he does from

day to day as each new fact, law, or principle is concretely presented. The method is mainly inductive and synthetic, and it cannot be otherwise without doing violence to the nature and interests of the adolescent intellect.

In other words, the beautifully logical structure of any particular science, or of all science, which is the teacher's ultimate objective on the side of subject matter, must be built up by methods that are thoroughly psychological and from materials that are within easy reach. Many are the surprises and thrills that await the earnest pupil when he reaches some point of vantage ground whence he is able to see the unexpected results toward which his carefully directed experimentation and thinking have been tending. After the particular and concrete facts are grasped and appreciated, generalization for the adolescent is a real joy, for in this he feels that he is laying hold of and securing for future use the whole field of knowledge through which he has labored; and further satisfaction is in store for him when he comes to know the applications of these laws and principles, which, as it seems to him, he has made his own by right of discovery.

Ever since the place of the laboratory sciences in the high-school program of studies became secure, it has been a general practice to give seven recitation periods per week to each science, the extra time being allowed on the ground that the manipulative and observational part of the work demands more time than is needed for other subjects. It has also been a rather common practice to use four of the seven periods for laboratory work. Thus far the time arrangement has not been seriously called in question. However, it must occur to the reader that this plan of setting aside definite days for laboratory exercises does not suit the method here proposed; in fact, no "laboratory

exercises" or stunts, as such, are contemplated. Since the logical arrangement of the science determines the order of topics and since each topic is transformed for the use of the pupils into questions for which answers are to be found, problems to be solved, or projects to be accomplished, the plan of procedure must be sufficiently flexible to permit of the class time being used in any way best suited to the changing demands of the work to be done, the exigencies of the situation giving rise to changes of plan as the work proceeds, all this, because no one can foresee the interests and needs of the pupils as they move forward with their definite tasks.

Thus the class time may be devoted to observations in laboratory, field, or industrial plant, to experiments, to developing questions and problems preliminary to these, to reviews and discussions of the results obtained with a view to clear, adequate, and usable formulation, to tabulating results and charting data that they may be made effective for the purpose in hand, to descriptions based on observations, experiments, and readings as an aid to clear and effective thinking, to verifying results by any suitable tests that may be devised, to oral and written examination of the pupils' understanding and appreciation of what they have accomplished, to making clear the relation of the results obtained to some simple scientific law or principle, to throwing the whole into its proper perspective relative to the entire science, or to any other means of meeting the requirements of the changing problematic situation with which the class is confronted. The flexibility here suggested does not introduce any new administrative problems, since the proposed method does not call for any shifting of the double periods, the only exception being due at times to the availability of biological materials. The method here suggested is not new; all phases of it are usable.

If the aims and purposes of science teaching are to be fully realized, and if the natural interest of high-school pupils in the thinking processes is to be capitalized, there must be as the work progresses a constant effort to foster this interest and to make the pupils aware of the scientific methods and the reasoning processes as such; hence, the pupils must focus not only on what is done but on the methods by which it is done. This attention to method should include frequent appeals to the constructive imagination as a basis for initiative, cautioning against hasty and unwarranted inferences, training in sustained effort, and fostering a spirit of optimism relative to the outcome of all worthy effort. All this is in the interest of individual development and the fixing of scientific habits and ideals. The degree of enthusiasm for the methods used and the logical processes followed will determine largely the amount of transfer of scientific attainment into other fields, in other words, the effectiveness of the teaching.

When the method here suggested is used, the number of scientific facts and principles covered by the class may not be so great as when a condensed, conveniently arranged textbook is followed closely, and as when the textbook assignments are paralleled by exercises and experiments on "laboratory days," done for the purpose of "proving" or "illustrating" laws and principles; but we cannot, as Dewey has pointed out, "assume that presenting subject matter in its perfected form provides a royal road to learning." The real aim is not to teach the pupils "science" but to teach them "the scientific way of treating familiar material of ordinary experience," for knowledge of science may remain as inert as any other kind of information.

Because the biological and the physical sciences deal with phenomena of such different character, a separate treatment will be more definite and profitable.

CHAPTER VIII

BIOLOGICAL SCIENCES

I

The more one studies the nature of adolescence, the more one is aware of and impressed by the lack of agreement as to individual characteristics; in fact, as we pass from one individual to another, we find a variety of even contradictory traits. But in all normal adolescents there is one common and inspiring characteristic and that is *life*, and life in abundance. At this time the stream of life is often swollen and surging, and the intellectual and social currents are most vigorous as they move forward and develop momentum, impelled by the new and strange physiological changes that are taking place. It would seem that the presence of this common characteristic should be pedagogically significant and suggestive. It is not far-fetched to expect that whatever objects embody and exhibit this distinguishing trait of *life* will make an effective appeal when presented to high-school pupils in a manner suitable to their intellectual needs. It is a case of bringing life face to face with life. Thus we should expect much interest in the sciences that deal with life and its endless and varied manifestations. An unprejudiced pursuit of the principles which underlie all life should be not only engrossing but also fruitful in a practical way, since these vital principles shape life in all its aspects. For the youth and all others endowed with his enthusiasm, there is in life, as William James has said, "that strange union of reality with

ideal novelty that it continues from one moment to another to present"; there is a character of progress, and this progress appeals to the imagination and to the intellect of youth. From a psychological point of view, our high schools do well to make the first systematic approach to the phenomena of life during the years of early and middle adolescence.

Because the biological sciences are placed early in our high-school curricula, care is needed to employ methods of presentation that are suited to this stage of the pupils' development. It must be kept in mind that life is a vital rather than an intellectual process and that the biological truths and principles which we desire to inculcate are to be distilled out of living processes rather than out of logical classifications and deductions. James was fond of reminding his readers that life "exceeds logic, overflows and surrounds it"; and Bergson warns us that our thought, which is created by life, cannot embrace life, "of which it is only an emanation or an aspect." But since the human intellect has been and continues to be formed by contact with the reciprocal actions and reactions of the things in nature with which it is continually surrounded, it must needs be that the mental processes, which are now rapidly developing and include the logical, have been evolved during the ages by this vital contact, and therefore are naturally well suited to the pursuit, and the joyful pursuit, of living phenomena. In the interest of economy, the knowledge of nature thus gained must be somewhat systematic. Putting these two concepts together, it would appear that the methods used should be both intuitive and logical, taking heed that the letter of the laws discovered and the logic of the thought processes pursued do not kill the spirit.

II

Because botany and zoölogy are generally begun earlier than the formal study of chemistry and physics, and because, as we have seen, it is a case of young, overflowing life pursuing the phenomena of life, there seems to be a demand for separate treatment of a few methods that pertain to the teaching of the biological sciences.

There are other characteristics of these sciences that suggest differences in treatment. "The most fundamental characteristic of living things," as John Fiske asserts, "is their response to external stimuli." "The more specific and accurate, the more complex and extensive, is the response to environing relations, the higher and richer the life." [1] This ready response to stimuli, with its implications, suggests a rich field of observation and experimentation somewhat peculiar to the sciences that deal with life. Sciences may be classified according to the methods of study natural to each. "Thus," as W. F. Ganong has suggested, "Botany and zoölogy are chiefly observational in method, and are extremely alike in most of their features; chemistry and physics, though not resembling each other in subject matter, are alike in being experimental in method." [2]

Huxley has called our attention to the tendency of life's forces "to disturb existing equilibrium—to take on forms which succeeded one another in definite cycles." This tendency, when discovered through some of its specific manifestations, furnishes much food for scientific thinking of a very interesting kind. Here the pupil may learn to see the permanent in the transitory and do some generalizing relative to the continuity of life, an important biological principle.

[1] Fiske, John, *Through Nature to God.* Houghton Mifflin.
[2] Ganong, W. F., *The Teaching Botanist.* Macmillan.

Both botany and zoölogy abound in problems growing out of the relation of form and structure to function. There is always in this relation ready at hand an interesting and fertile problematic situation, thought provoking, and usually well suited to the abilities of pupils in their early teens. This relation of form to function supplies a type of problem in the solution of which the pupils will soon learn to take the initiative. However, this kind of problem teaching seems to run counter to the strictly logical classification of biological phenomena into morphology, ecology, and physiology; but life has a higher logic than the logic of the schools, and whatever method correlates most closely with nature's manifestations appeals most strongly to the adolescent's desire to find unity of purpose in all that surrounds him.

Closely related to the type of problems here involved is another set of problems always emerging from thoughtful biological studies. These problems grow out of the continuous adjustment of all organisms to their environment, the character of the adjustments ever harmonizing with the nature of the environment as to simplicity or complexity. Here is a field of mental endeavor calling for as much refinement in thinking as the intellectual development of the pupils warrants. Here we have, as G. R. Twiss points out, "division of labor and specialization of groups of cells adapted to perform the various kinds of adjustment both among the working internal parts of the living machine and in the organs by which it responds to stimuli from without." [1] Biological method cannot well neglect the principle and the problems here involved.

Although not strictly confined in its workings to the phenomena of life, the principle of evolution is now so

[1] Twiss, G. R., *Principles of Science Teaching.* Macmillan.

thoroughly integrated with all phases of biological study and thought that it seems to belong especially to the phenomena of plant and animal life. There is ever present a "continuous progressive change, according to certain laws, and by means of resident forces"; and this life, which the pupils see revealed in the individual, they come to discern as a vital force, continuous and impelling, in all plant and animal forms. It is not necessary to argue or to review the evidence in favor of organic evolution, but the teacher who is imbued with the spirit of problem teaching will naturally call the attention of his pupils to the most obvious facts and relations that are manifestations of progressive change, thus allowing the principle of evolution to grow gradually in the minds of his pupils.

Again, in the study of botany and zoölogy, there is a splendid opportunity to teach the principle of classification by direct application. There can be no better means of enforcing the advantages of natural classification, for here the pupils are in the presence of a great mass of facts that are hopelessly bewildering unless some effective system of organization can be found. Like the principle of evolution, this principle should be a matter of gradual growth in the minds of the pupils.

All of these considerations, most of them being biological principles, appear to suggest a somewhat distinctive method of presenting the biological sciences.

III

The natural interests of the pupils demand that a large proportion of the time be spent in the laboratory and in the field. The work will begin with a type plant or animal. No time will be spent merely observing or dissecting it. Problems based on biological principles will at once be raised; and if well chosen and formu-

lated, these problems will naturally stimulate the kind of observation and suggest the sort of dissection that result in accurate and worth-while information. This information may be recorded in the form of laboratory notes and drawings, a kind of laboratory effort that can easily deteriorate into a purely mechanical exercise, or it may be simply held in mind for immediate use. If the information serves as a basis for vigorous thought and reflection, memory may generally be trusted to do the recording. The teacher may well hold himself to the rule that no time is to be spent making notes and drawings unless the record is definitely needed in the solution of some problem or in establishing some biological principle. The same may be said of mere manipulation with or without instruments. As Dewey insists, "One's mental attitude is not necessarily changed just because he engages in certain physical manipulations and handles certain tools and materials." [1] The laboratory technique must be turned to intellectual account, otherwise the pupils will be bored and their enthusiasm for the subject dampened just as surely as if the time were spent in reciting in an orderly way scientific information learned from a textbook. The purposes of laboratory and field work are to get scientific information, to gain manipulative skill, and to solve worthy problems experimentally; but the intellectual interests of the pupils dictate a method such that the information and skill shall be obtained in connection with the solution of problems.

If the immediate object in biological observation and experimentation is the solution of a problem or the accomplishment of a project, the whole process will naturally be energized and put upon a higher intellectual level. As Huxley has said, "The method of scientific investigation is nothing but the expression of the

[1] *Op. cit.*

necessary mode of working of the human mind. It is simply the mode in which all phenomena are reasoned about, rendered precise and exact." [1] These modes of the human mind are necessary, because all race experiences, including the body of scientific knowledge that we believe should be the heritage of our high-school pupils, are human both in their origin and in their interests. The getting of this accumulated knowledge through observation and experience, directed by the best thinking of which man has been capable, is one of the many factors that have made the human mind what it is; hence, some kind of an investigating method is the natural mode of approach in science. All this is contrary to the assumption on which much teaching of botany and zoölogy has been done; the race experiences which we have decided the pupils should inherit have been first logically classified and scientifically labeled then presented to the immature minds of our pupils. It seems delightful, as Judd once said, to begin and go on "in a coherent march" through any science "in such a way as to bring the student into exact knowledge and into precise forms of reasoning." But as a result of such teaching, we have been in danger, according to statistics referred to in the preceding chapter, of losing both the race experiences and the pupils, since the race experiences are safe only in so far as they are actually inherited by our pupils, and the pupils are ours only in so far as we are able to interest them.

It is not here advocated that the high-school pupils must be led to rediscover the truths of science—our best equipped teachers themselves would not be able to do this; but it is suggested that, so far as possible, the methods of teaching shall be the methods of discovery. The attitude of the discoverer has always

[1] *Man's Place in Nature and Other Essays.* Dutton.

been a problem-solving attitude. Thus both the origin of scientific knowledge and the nature of the adolescent intellect suggest the use of problem-solving methods in the high-school sciences.

This means that the mature and inflexible logic of the sciences must give place at the beginning to methods as flexible and intuitive as those used by the discoverers. Discussion, observation, experimentation, interpretation, application, and all forms of reasoning shall merge according to the exigencies of the work. The problem or project will often be introduced by informal discussion based, as far as possible, upon materials already familiar to the pupils. The observations in field and laboratory must be specific and analytic and always controlled by the demands of the problem. Observation is an active process, and there must be a continuous appeal to the scientific imagination. The experimenting and the dissecting, also, are governed by the problem motive. "Training by isolated exercises leaves no deposit." With the early adolescent, we should avoid manipulations and the use of apparatus requiring highly specialized forms of skill, especially such forms of skill as will not be used elsewhere. In all cases, the aim of experimentation is to control and simplify for a definite purpose the conditions under which a series of events unfolds; and it is the function of the teacher to determine this purpose and to a large extent to control the conditions. "The laboratory situation," as Judd asserts, "is usually too complex for the immature student to master if left to his own devices. The experience of the race must be focused for him on this complex situation. He must be led by a short path to the productive conclusions which science has reached as a final result." [1] The interpretation of results will be obtained as far as possible from the

[1] *Op. cit.*

pupils. And the application of conclusions and principles arrived at will naturally function in the form of deductive reasoning; in fact, the generalizations reached are ultimately useful only to the extent that they are made the basis of deductive reasoning. If the methods used are to be transferred to other fields of effort, the pupils must have their attention focused upon them as usable methods; this part of the work demands high teaching skill.

Although botany and zoölogy are distinctly field and laboratory sciences and a large portion of the time is spent in the handling of materials, the classroom recitation is very important. The work done in the field and laboratory naturally gives a more or less disconnected body of facts, in spite of all efforts at logical sequence. The findings need to be supplemented and woven together into an orderly and significant whole. The stage of mental development of first- and second-year high-school pupils warrant considerable theoretical discussion. To omit this is to fail to recognize important adolescent developments; for the minute and carefully gained personal acquaintance with scientific facts takes on new interest and meaning when the thoughts of the pupils are turned toward the relation of the phenomena to far-reaching principles and applications. Pupils at this time are readily interested in the way that familiar facts and newly discovered truths connect up and fit into the larger view of the material world. Moreover, the practical and especially the economic aspects of school work now make a strong appeal; the object of science is "not to show us the essence of things," as Bergson asserts in *Creative Evolution*, "but to furnish us with the best means of acting on them." Much of this supplementing, enriching, harmonizing, and applying of results can best be done in the classroom.

At times, teachers of the biological sciences have tried to dispense with all use of textbooks. Experience has proved them wrong. A good text is needed as an aid to the immediate work and as a means of training the pupils in obtaining knowledge from the printed page and from pictures and drawings. The textbook assignments and laboratory work parallel and supplement each other, and both should be so managed that they will not appear as something more to be learned but as aids in the solution of the problems. The carefully conducted recitation on the text is the most effective means of placing responsibility on high-school pupils for the results of their reading and its application to problem solving.

All that is said in a former chapter concerning classroom procedure applies to the science recitation; however, in nearly all discussions of scientific topics it is especially important, in the interest of clearness and mutual understanding that there should be constant use of illustrative material and analytical drawings. The drawings used in the recitation and in the notebooks are never for their own sake, but always used as a means of clearly representing objects, relations, or steps in the solution of problems. A neat diagrammatic drawing accompanied by description or with parts properly labeled is generally more helpful than a picture however artistically drawn. This type of drawing is analytic and selective, representing only the aspects and characteristics of the object or situation under consideration. Neither the laboratory period nor the class time should be used for lessons in drawing. One is for observation, recording, and making use of the essential results of observation and experimentation; the other is for relating and fixing conclusions. Scientific method and thinking demand a close coöperation of eye, hand, and mind.

Both the psychology of adolescence and the psychology of the subject suggest that there should be maintained throughout all phases of the work a "plot interest." When seeking and formulating the problem, when deciding upon a method of attack, when observing, experimenting, and securing data, when thinking out the application of these data to the problem, when closing in on the conclusion, and when verifying the results—through all this must be movement and change, an atmosphere of expectancy. The changes due to life naturally occur in a cumulative order, hence the elements of a dramatic situation which must be capitalized by adroit teaching. In general, this plot interest may be maintained by treating plants and animals as beings that do something, as beings with parts whose structures and functions harmonize, as beings whose instincts and movements form an orderly series and are marvelously fruitful and effective. The drama is present wherever there is life, and the "plot thickens" under the art of the teacher.

CHAPTER IX

PHYSICAL SCIENCES

I

A survey of science teaching in the secondary schools of the country made by Dr. G. W. Hunter of Knox College indicates that in most senior high schools general science is taught the first year, biological sciences the second, chemistry the third, and physics the fourth. This placing of the physical sciences in the upper years of the high-school curriculum is in keeping with the psychological and pedagogical demands of the subjects. The curiosity of the early years of adolescence (thirteen to fifteen) is well suited to any study in which observation plays a dominant part, as in general science, which aims to develop a scientific interest in and attitude toward the material world by which the pupil is immediately surrounded, and in biology, which appeals, through first-hand observation, to the pupil's developing power to discover and understand functional relations; but the more mature powers that come with middle adolescence (fifteen to eighteen) are needed to understand and appreciate the more abstract laws, principles, formulas, and theories to which a study of physical phenomena leads. Moreover, as chemistry and physics are now taught, the pupil needs as a prerequisite the knowledge of mathematics which he acquires during his first two or three years in high school.

The method of presenting the physical sciences should be determined largely by the intellectual matu-

rity and interests of the pupils. As in all subjects, the other method-determining factor is the function of the physical sciences found in our program of studies. As we should expect, this function has been variously stated. When stated in terms of subject matter, it is the function of the physical sciences to provide a classified knowledge of those properties of matter that can be measured and especially to discover workable laws relative to all phenomena that are connected with changes due to the action of forces and the transference and transformation of energy; in theory, there is always included the advantageous employment of these properties and forces. When stated in terms of mental growth, the physical sciences have for their function the development of a scientific attitude of mind and a method of attacking and thinking through problems dealing with physical phenomena. From the viewpoint of this book, the subjective formulation of function is more helpful in determining teaching methods than is the statement based on content. It is generally more fruitful to think of all science teaching, not as the inculcation of a body of useful scientific information, but as a means of establishing in the pupils a scientific habit of mind toward all phenomena, including standards and ideals relative to the kind of evidence required and the thought processes needed to substantiate a belief as distinguished from a guess. The pupils' intellectual legacy from the past is not a ready-prepared gift of valuable knowledge, but it is rather a patrimony that can be secured and appropriated only by efforts somewhat similar in kind to the efforts put forth in the original winning of this scientific heritage. On psychological grounds, it seems that Dewey's explanation of the discouraging falling off in high-school science is correct, when he maintains that it is due to our teaching of the sciences as completely organized

bodies of knowledge rather than as a means of training in scientific thinking, "the only method of thinking that has proved fruitful in any subject." Dewey would have the results of science teaching a *state of mind*, in which scientific curiosity, flexibility, patience in seeking relations, open-mindedness, and orderly habits of procedure dominate.

This conception of the function of science certainly emphasizes the importance of method, since the chief aim is to establish an attitude and fix a method. Professor C. R. Mann, who thinks of the physical sciences as the progeny of industry, would classify the sciences not by their aims, but by their methods; and he defines the method of science "as that method which furnishes the most expedient solutions of the problems defined by human needs." [1] Thus we are back, as in the biological sciences, to the problem method. A problem means something definite, and, in this case, something concrete "put before" high-school pupils for consideration with a view to reaching an important result.

II

For pedagogical purposes, one may conceive of chemistry and physics as organized collections of problems that the human mind has formulated and solved. As compared with the problems and solutions involved in biological studies, the results, in the form of laws and principles, can be more definitely formulated, and they are in most cases capable of quantitative statement. This means that the mathematical aspects of the physical sciences are significant, and this naturally has a bearing on the methods of attacking the problems and the results reached by the pupils. However, it must not be understood, in the case of high-school teaching, that the method is to be quantitative to

[1] Mann, C. R., *The Teaching of Physics*. Macmillan.

any great extent; under the influence of recent college courses, young teachers have tried this method with disastrous results, as judged by the pupils' manifest apathy and sometimes disgust.

Not only are the problems of chemistry and physics very definite as to formulation and solution, but they often require careful management of apparatus and a patient and sustained effort, because of the numerous elements involved and the sweeping generalizations which emerge. This suggests the need of skill on the part of the teacher in placing the conditions of the problems before the pupils and care in guiding the manipulations and the thinking processes. High-school pupils in general are not experts at manipulation, and their thinking is often crude.

III

Thorndike and many other writers on education have emphasized the fundamental importance of *doing* in connection with all teaching, on the ground that to have something happen is "instinctively satisfying" to the pupils. It should follow from this psychological principle that the experimental sciences should make a strong appeal. Now, chemistry is preëminently a laboratory subject, since very few facts concerning chemical properties and relations can be obtained without experimentation. As in the biological sciences, much knowledge must be based on observation, but generally there is very little to observe directly. The instinctive demand for something to happen and the experimental basis of nearly all chemical knowledge is a conjunction psychologically fortunate for the teacher of chemistry, "because," as Twiss intimates, "perception of its facts and acquisition of its concepts are not favored so highly as the other sciences are by familiar experiences and common sense intuitions in terms of

which the facts and relations that are presented in teaching can be interpreted." [1] The chemistry teacher "has strong allies in the original tendencies to manipulate and experiment." That is, his work is instinctively motivated.

If the problem method is used in teaching chemistry, the pupil should begin by getting his data for his problem through some simple experiment. Thus, the psychology of the situation, as Twiss has pointed out, leads to important pedagogical conclusions: (1) provision should be made for "a large amount of individual laboratory experimentation, and (2) the very first lesson and every succeeding lesson in which a new topic is taken up should be an experimental problem in which the pupil himself is the experimenter, guided and assisted, of course, by the teacher." [2]

For many years writers on educational methods have elaborated and urged the inductive mode of approach; yet many are the teachers and textbooks that introduce high-school pupils to the study of chemistry by discussing the meaning of physical and chemical changes, the place of chemistry among the sciences, the difference between mixtures and compounds, and other matters of a general nature. These teachers and writers are in theory doubtless fully committed to the inductive-problem method. Have they not the courage of their convictions, or are they unable to break the bonds of tradition and habit, or do they think there is economy of time and effort in a deductive approach? Once a year let such teachers remind themselves of our two familiar principles: (1) effective teaching is based on doing; (2) generalizations are meaningful when they originate in some kind of immediate experience. "Only so much do I know, as I have lived" is Emerson's dictum.

[1] Twiss, G. R., *Principles of Science Teaching.* Macmillan. [2] *Ibid.*

How, then, shall the teacher begin? He will do well to cast about for some problem for which an easy experimental solution is the only natural solution. Smith and Hall suggest the problem, "why does iron rust?" This is certainly a familiar chemical phenomenon, and the problem calls for only simple experimentation and easy scientific thinking. There will be need, as the solution proceeds, of a few thought-provoking (not leading) questions; and there will be occasion for a number of supplementary experiments and questions before a correct and complete general statement of results is reached. It is not necessary to suggest to the experienced teacher of chemistry that, when the answer is obtained, the pupils are ready to go forward with an experimental study of oxygen, and that their *readiness*, not the logical demands of the subject, is the great desideratum. This line of attack naturally leads to an appreciation of the value of chemistry and an understanding of the meaning of elements, compounds, mixtures, and physical and chemical changes. It will be understood that the use of experiments here recommended as an educational method has nothing in common with the formal experiment often employed to illustrate chemical definitions and properties. The illustrative experiment is tacked on at the discretion of the teacher as a device for clearing up matters already explained and discussed, and the true experiment *grows out of* a much-felt need for aid in solving a chemical problem.

The difference between successful and unsuccessful teaching is often a difference in emphasis. In selecting chemical facts to be taught and emphasized, according to Twiss, we should seize upon "facts that are most closely related to the pupils' previous and concurrent experiences," "especially facts that the pupils are most likely to meet and need to use in their daily lives, now

or after they have finished with school." [1] No reader will object to this class of facts receiving first consideration; but on what ground is the choice made? Is it merely because we wish to impart practical knowledge? There is a psychological reason which is pedagogically more important than supplying information that the pupils are likely to use. The adolescent, with his broadening social outlook, is attracted and readily interested in whatever appeals to him as worth while and applicable to human needs, and this notwithstanding his developing idealism; usable facts are fortunately entirely adequate to the teaching of chemical laws, principles, and hypotheses. But more important than either practical knowledge or chemical principles is the scientific habit of thought that we wish to develop and foster through the use of scientific methods consciously employed; and the degree of success in building up and fixing scientific methods of dealing with problems depends almost entirely upon the pupil's *attitude* toward his task. This would seem to be the main reason for emphasizing the practical things in chemistry.

How shall chemical laws and theories be taught? If the work is so managed that the laws appear to the pupils as summaries or recapitulations of the knowledge acquired through observation and experimentation, they will have a sort of *personal interest* in formulating concise comprehensive statements of results; such generalizations may well emerge as the joint efforts of the class, the work thus making a social as well as an intellectual appeal. The form of statement encouraged should be such as to imply the incompleteness of the inductions and the tentative nature of the conclusions, this being in the interest of scientific truth telling and the habit of basing results on personal knowledge. Chemical relations being quantitative, the language

[1] *Ibid.*

used in formulating conclusions should recognize the quantitative nature of the science, which implies the possibility of measurings and weighings. The chemical theories should be introduced only after the pupils appreciate the facts and relations which the theories explain.

During the early stages of the course, language based on facts, as distinguished from the language of theory (the atomic theory, for example), should be used by both pupils and teacher, because it must be always understood that the laws and formulas are merely the results of chemical analysis and because we are in every way to cultivate a matter-of-fact, scientific attitude, which always distinguishes carefully between what is directly known and what may be inferred or what may be superimposed by way of explanation. The pedagogy of the subject demands that the laws and theories be introduced gradually, only after a sufficient number of specific cases have been studied and there has come to be a felt need for résumés and explanations.

Problem material in chemistry is abundant, and in the main the laboratory is the place in which to work out solutions; yet a good textbook is an essential. There are many facts not readily acquired through experiments that are needed in the solution of chemical problems; hence the text is needed as a reference book. Nearly all recent textbooks are well organized and conform to the logic of the subject; therefore they are a convenient means of reviewing the facts discovered by experimentation and the principles developed by scientific thinking. Reviewing is an important part of the educational process. In the textbooks, too, chemical theories are set forth in a clear and interesting form, and they are always interesting to adolescents who have the background necessary to their apprecia-

tion. Thus, after pupils have learned the facts by using their own senses and have thought out the relations and have made their own generalizations, they may profitably be given textbook assignments. But let it be understood that the pupils do not really get knowledge from the books; they get words and formulas which they may be able to translate into knowledge.

In conclusion, it is urged that the reader who would become imbued with the methods here suggested and would obtain concrete examples of how to apply them should read what Professor G. R. Twiss has to say or some of the other authorities cited in this chapter. The present treatment is too brief to be more than suggestive.

IV

In the teaching of physics, the situation at the beginning is very different. In this field, not only common phenomena, as in the case of chemistry, but everyday experiences may furnish a natural introduction to the subject. Physics is a science that deals with the things by which we are surrounded and the forces which have been made to minister to nearly all our economic and cultural wants. Our homes and schools, the streets, and manufacturing plants furnish a constant supply of physical phenomena and experiences. Those who have eyes to see may see, and those who have minds to think may be filled with wonder and find problems to their liking. But nearly all the pupils in our high schools have been surrounded all their lives by this magic-working array of materials and forces; they have cared for the furnace, eaten food from the fireless cooker and the refrigerator, lighted the gas, turned the electric switch, made "dates" over the telephone, driven an automobile, and done a hundred other things that are possible only because of the

science of physics. Although they are unable to explain any of these, their curiosity is not greatly stirred. However, it is both convenient and pedagogical to begin with common physical phenomena in the pupils' immediate environment. But how shall we engender the necessary curiosity, how lead them to think? This is the teacher's problem.

Thinking relative to familiar phenomena is aroused only when a problematic situation appears. A problem arises and thinking may be expected to begin when some discrepancy between the common-sense view and a carefully observed physical fact is noted. When a novel constituent is found among familiar things, the pupil naturally begins to marvel, and his intellect is challenged. His curiosity is not satisfied until the incongruity between the old intuitive view of the matter and the strange element is cleared up. Thus the teacher's function is to call attention to or bring about some seeming incongruity, that is, to create a problematic situation, so that there may be a checking up and harmonizing of the new and apparently incongruous cases with the old common-sense notions. When enough of this has been done, a scientific principle will emerge, a principle new to the pupils but already in the mind of the teacher when the trying-out process began. The statement of the principle or law, as in the case of other natural laws, will be merely a brief mode of summing up all the facts that have been discovered and removing the incongruity. To illustrate, ask the pupils why Mr. Smith, the grocer, sprinkles his floor with water on a warm afternoon. The common-sense reason for sprinkling floors is to lay the dust; but Mr. Smith does not sweep his store in the afternoon. How are stokers on the ocean liners able to live and work in a place where the temperature is twenty-five or thirty degrees above blood heat

without becoming overheated? Why does liquid run up in a siphon? When two boys carry a pail of paint between them supported by a stick, why does the boy with the "long end" carry less than half the load? Why does an iron kettle float in water, or an iron ball float in mercury? When heating water in a dish, why is the water nearest the fire not the warmest? Why does a straight stick appear bent when placed obliquely in water? The simple observations and experiments necessary to clear up these incongruities are easily managed. If desired, such problem-raising questions may be arranged in the order of the corresponding physical principles found in the textbook.

Teachers of experience know that high-school pupils do not spontaneously discover these discrepancies and become excited about them. The ability to make such discoveries belongs to genius. When the teacher succeeds in calling attention to the incongruity, however, between the common-sense view of familiar phenomena and such unobserved facts as point the way to natural laws, and when he succeeds in arousing a strong desire to bridge the gap, to establish a mental connection, he provides a natural and strong motive, one that will spur on the intellectually alert members of his class to purposeful and vigorous observing, experimenting, and thinking. As Dewey has pointed out, the pupils' feeling about the matter comes first in importance, because the feelings control the will; and "knowledge is impossible without feeling and will."

When a pupil has struggled with several concrete problems and his efforts have been rewarded, when the desired generalization is reached and expressed in fitting words, he should begin to realize that experience has been raised to "the position of a giver of laws."

But all who have taught know well that it is not

practical to stop when a law or principle has been reached, however complete and thoroughly understood the inductive processes may have been. The inductive processes must be reviewed, and many applications of the derived principle must be sought out and discussed. This additional work is a psychological necessity, in order that "an interlocking group of memory bonds" may be formed and the chances be increased for the successful application of the principle to new cases. We must not say our pupils know the laws but cannot apply them. This is a contradiction, due usually to a confusion between real knowledge and verbal accuracy, real knowledge in this case being equivalent to practical understanding.

After progress has been made, still another step may be taken. Thus far the process has been psychological; everything has been shaped to the intellectual interests and needs of the pupils. But we shall not do justice to the developing instincts and mental powers of adolescent boys and girls if we fail to point out, as a final step, the wonderful logic of the subject that has been built up and gradually perfected by the many great minds of the past centuries; the close logical organization of the subject matter of physics, with all the thrills that it is capable of awakening, can best be instilled into the minds of the pupils by showing them from time to time how each new fact and law fits into the logical structure. This part of the work should be a progressive process, somewhat similar to that which has been going on ever since man first became interested in physical phenomena. In this summarizing and organizing process, the pupils certainly need help; because the whole is equal to all its parts, it does not follow that even the most capable pupils will be intellectually competent to reconstruct the whole and thus get a glimpse of the great unity of

nature. Thus it would seem, as claimed by Twiss, that the high degree of logical perfection that the physical sciences have attained is, "if rightly used, a means of high value in forming habits of straight and connected logical thinking." [1] It is helpful and intellectually inspiring to follow the thinking of great minds.

But the weakness of science teaching in the past has come in a large measure from the undue influence of this very perfection and beauty of organization which so dominates the textbooks and charms the mature reader. As already indicated, the teaching has been logical rather than psychological; the logical order has been: (1) definitions and principles, (2) laboratory demonstrations and illustrations, (3) practical application. The reader who has followed the preceding discussions will agree to C. R. Mann's summary: "In the new psychological method the order is: application, problem, solution in the laboratory, principle." [2] To this we have added further application, including the proper orientation of the new knowledge as it is acquired. The method recommended is intuitive and creative; the methods of logic are reflective and critical. It is the function of logic to survey, organize, and crystallize what the inductive, creative processes of the mind have been able to discover; in science, the educative process is not complete until the results psychologically obtained have been logically formulated.

Since the problem method here proposed makes the laboratory a constant necessity, a few suggestions relative to its use are added. The use of the laboratory equipment should be restricted to such experiments as are felt by the pupils to be, as Twiss expresses it, "necessary steps in the solution of live human problems

[1] *Op. cit.* [2] Mann, C. R., *The Teaching of Physics.* Macmillan.

that the pupils have some real, sane reason for desiring to solve." [1] Moreover, all the solutions of problems must lead to interest in the application of significant physical principles, and this practical interest ensures an understanding of these principles. This means there is no psychological reason for spending the first days in the laboratory on mere manipulations and practice in measuring with the various instruments used in quantitative experiments, in which success is judged by the agreement of results with known absolute values. Like the teacher's old jokes, these values are passed on from year to year, and these quantitative exercises lose their effectiveness even as practice in accuracy. Any one in sympathy with the adolescent and his craving for significant results can imagine the state of mind this scientific fussing produces and why the pupils refer to this kind of exercises as "physics stunts." Mann's doctrine is psychologically correct: "The experiment that is attempted before it is justified in advance, or before a need for it is felt, is of little real educative value." The concrete problem situation pointed out by the teacher in each case is the justification of the experiment, and it causes the pupils to feel its need.

In directing attention to the problem and creating a desire for its solution, the teacher does not, of course, issue detailed directions as to the method of procedure; it is part of the pupil's problem to determine to some extent the nature of the manipulations needed. In other words, we get away from the superstition that, to teach ideas effectively, all we need do is to appeal to the senses by means of suitable physical objects. As Dewey has said repeatedly, things and the sensations which they produce are indeed necessary to human development, but this development results only when

[1] *Op. cit.*

the things and sensations are *used* vigorously as part of a thinking process directed to a definite end.

When a problem is clearly before the class and the pupils feel the need of a definite line of experimentation, by whom shall the experiment be performed? by each individual working separately? by groups of pupils working together? or by the teacher with the class observing and aiding? In the early years of laboratory science in the high school, the experiments were performed by the teacher and tended toward the spectacular. Later, in the larger and better equipped high schools, an effort was made to have the individual pupils do nearly every experiment, to encourage independent effort. At present the best practice does not follow any of these methods exclusively. Individual experimentation has been found to consume too much time and to require very expensive equipment; and since it is not always sufficiently skillful, it does not ensure independent thinking. A large number of the necessary experiments can be *conducted* best by the teacher, aided frequently by the pupils, the accompanying questioning and discussion serving as a means of stimulating independent thinking. For certain phases of the work group experiments are profitable, the teacher supervising the work of the groups. There are a few simple experiments, however, that ought to be done by every pupil in the class, experiments of such a nature that the individual needs to handle the apparatus in order to obtain and effectively observe the results. Perhaps in a manual training school, where skill in manipulation is a prime object, it may be well to require many individual experiments. In some cases simple individual experiments can be used to advantage in connection with the regular class recitation. In brief, the nature and purpose of the experiment must determine by whom it shall be performed.

There are many psychological reasons for writing laboratory notes which need not be stated here. Experienced teachers generally agree that the notebook should contain full, clear, and concise statements as to the following steps: (1) the problem to be solved, the purpose of the experiment, (2) description or direct drawing of the apparatus and material, (3) explanation and justification of the method of manipulation used, (4) tabulation of numerical data and the method of procuring data and results, and (5) conclusions reached, and, if needed, a discussion of possible chances of error.

The notebooks should be written evidence of purposeful, careful, well-directed experiments. Good form, but not set forms or blanks, should be insisted upon; and as far as possible the language should be that of the pupils. Unless good form and promptness are demanded, poor habits will be the result, and the teacher's task of reading the notes will be increased; consequently the keeping of notebooks had better be omitted. Twiss, who evidently speaks from experience, concludes his suggestions relative to notebooks as follows: "All this is grueling work for the teacher, but there is no escape from it if the pupils are to be properly trained. The better the teacher is at inspiring his pupils with ideals of efficiency, the less arduous his work with notebooks will be." [1]

It does not seem well to end this chapter with the accent on the mechanical aspects of physics teaching. In all work with adolescents, the human note must dominate. The fact that pupils who were unsuccessful in high school frequently reason well and apply the necessary tests to the results of their thinking when confronted with actual problems outside of the school appears to prove that somehow we have dehumanized the work in science; this is especially the case with

[1] *Op. cit.*

pupils who have reached middle adolescence. On the human side, it is a question of suitable motivation; on the material side, it is a matter of specific concreteness. The pupils must feel a real personal interest and an urgent need, and at the same time they must be provided with a means for the satisfaction of these interests and needs. The more points of correlation there can be established with situations outside of the schoolroom, the more humanizing will be the result, since this is one way of emphasizing the human need. This, too, is a way to introduce the emotional factor, so necessary to all efficient teaching of high-school pupils; for, as Bagley has pointed out, "the prime source of emotional factors is the fundamental needs of the individual, and the next most prolific source is humanity and its needs."

Further, if we are to make the work in high-school science broadly humanistic, we must avoid all that savors of the hypercritical, over-elaborating attitude; the adolescent soon loses patience with this. Dr. E. E. Slosson, director of science service at Washington, expressed himself vigorously on this point at the 1924 meeting of the National Association of Secondary-School Principals: "The mental development seems to follow the order of the muscular, starting with whole-arm movements of thought and coming down gradually to the minutest investigation. The early years of adolescence are the period of sweeping generalization, of cosmical theorizing, of wild speculation, of unbounded ambition. Doubtless this tendency of the adolescent mind to enlarge its orbit has to be held in check lest it run off on a tangent and arrive nowhere. Yet, like other natural tendencies, it should be guided rather than thwarted. A study of the biographies of great scientists shows that many of the most important revolutionary generalizations of science have been

conceived in youth, often in the later teens or early twenties, though it required a lifetime of labor to substantiate them." In these matters of the intellect, as in social affairs, the youth must have his fling and indulge in "the free formation of bold hypotheses." This bird's-eye view treatment is superficial; but "a little learning is a dangerous thing only when what little is known is inaccurate."

In conclusion, what is the ambition of the teacher of physics, and how may this ambition be realized? Every real teacher is eager to do his work in such a way as to make sure that his efforts will bear fruit in other fields and especially in places beyond the walls of the school. No one thinks that the high school should aim or hope to impart a body of scientific facts and laws extensive enough to serve all future needs; and all who have a chance to observe know how few of the facts and laws supposedly well taught are held in mind by our pupils. What, then, may the teacher of physics reasonably strive for? He should count himself among the fortunate if he is able to imbue his pupils with the scientific attitude and establish scientific habits of thinking. "The problem of problems in our education," says Dewey, "is to discover how to mature and make effective this scientific habit." As was shown in the chapter on geometry, anything that the teacher wishes to fix permanently and make usable must receive some kind of emphasis. Common sense, as well as educational psychology, teaches this familiar dictum. Then since we wish most of all to establish the scientific method of attacking problems, the impersonal attitude toward results, the habit of thinking through problems, and the search for practical applications of the principles reached, it would seem that this method, attitude, and habit may be the very thing that the teacher of physics must continuously and

consciously emphasize. Not only must pupils be repeatedly made aware of scientific methods and habits through practice in many concrete situations, but they must somehow be made enthusiastic about the use of these methods and habits. This improvement will come naturally if the results appeal to the pupils as significant and worth while. As Bagley asserted many years ago, "When the high-school pupil finds that a rigidly controlled method of procedure . . . gains results that are of service to him and to the race, it is likely that he will have more effective respect for the method and its rigorous qualities than he would gain if it were attempted to carry him through a series of experiences ending in the contemplation of a logical and coherent body of facts and principles." [1] Thus, from the standpoint of usable results, it is the human and personal elements in science that must receive much attention if we hope to develop for the subject the enthusiasm natural to youth.

[1] Bagley, W. C., *The Educative Process*. Macmillan.

CHAPTER X

HISTORY

I

In recent years, the term social science has been growing in favor. As applied to the high-school program of studies, the social sciences include history, civics, economics, and sometimes sociology. We are also beginning to have textbooks on "general social science." About the middle of the last century, Buckle demanded that history become a science, and there have been attempts to make it such; yet no one thinks of history as an exact science, nor can it ever become an exact science. Nothing can be exact that deals with the manifestations of the human spirit; in this realm, all is complex, changing, evolving, and dynamic. It is difficult to conceive of history ever becoming a science even in the sense that physics is a science. History will continue to be devoid of quantitative laws. We need never to expect definitely calculable reactions on the part of any human being. Moreover, since history deals with human affairs, and teachers and writers of history are human, the presentation of historical facts and principles will always be colored, because of temperamental causes and prepossessions.

All this tends toward the conclusion that history is the most difficult of all high-school subjects to define; yet we need some kind of a definition in order to fix its aims and determine its functions. Aims and functions help to settle the place of history in the program of studies and serve as guides when considering methods

of presentation. "In the amplest meaning history includes every trace and vestige of everything that man has done or thought since he first appeared on the earth." [1] This inclusive definition by James Harvey Robinson forces the inference that, to meet the interests and capacities of high-school pupils, the treatment must be a serious matter of selection and proportion. Robinson's later definition better suits our purpose: history is "a study of how man has come to be as he is and to believe as he does." [2] History proper confines its attention to man considered as a member of society; hence it should have a strong social appeal to pupils of high-school age.

Although it may be granted that history is not strictly a science, much recent literature on the writing and the teaching of history in secondary schools urges a scientific treatment of the subject; that is, our treatment is to be accurate and systematic, and our conclusions are to be based on logically traced-out causal relations. These considerations will be discussed later.

II

The place of the social studies, especially history, is secure in our high-school curricula. In the Latin grammar schools, history was not taught as a separate subject, but ancient history received some attention in connection with the study of the ancient languages. Benjamin Franklin recommended the study of history along broad lines in the academy which he founded. At the beginning of the nineteenth century, history had gained considerable prominence; in 1847 Harvard and Michigan universities prescribed ancient history for entrance; and when the high-school movement began during the third decade of the century, history

[1] Robinson, J. H., *The New History.* Macmillan.
[2] Robinson, J. H., *The Mind in the Making.* Harper.

had attained a permanent and important place in our program of studies. In recent years it has fared better than the natural sciences. From its first introduction up to 1909–1910, there was a steady gain. During the years following 1910, there was a slight decrease in the percentage of pupils studying history, due seemingly to the increasing popularity of vocational subjects; however, in 1915 English composition and English literature were the only subjects with a larger enrollment than history. From the data at hand, it would appear that more history is now offered and that a relatively large number of high schools are requiring all the history they offer. Judd has sufficient warrant for saying, "There is evidently a general belief on the part of school authorities and students alike that history serves, in a very important way, the interests of broad, general education." [1]

This growing faith in the efficacy of history as a high-school subject continues in spite of the fact that much of the teaching in smaller high schools is done by teachers who have had no special training for the work, the idea prevailing that any one who is educated can teach history. The following discussions concerning the content of history and methods of presentation aim especially to help those teachers called upon to teach history without special preparation.

III

As with other high-school subjects, the aims and functions of history, on the one hand, and psychological considerations, on the other, will best guide our thinking in determining matters of content and methods; for in controlling the selection and presentation of subject matter, the purpose of a study and the nature and interests of the pupils are always fundamental.

[1] *Op. cit.*

There is no school subject for which a greater variety of values has been claimed, both informational and disciplinary, than are credited to history. This is especially the case as regards the disciplinary effects of this study. Every "faculty" known to the older psychology is developed and made stronger; and above all, memory, moral judgment, power of discrimination, imagination, and causal reasoning are, it is maintained, nurtured and matured by a serious devotion to the muse of history. On the side of information, history is supposed to furnish the kind of knowledge that makes for good citizenship and patriotism. Carlyle believed it to be "the most profitable of all studies." But according to recent critical students of history and history teaching, this is conceding too much for both the direct and indirect benefits of the subject. The claims are largely speculative and based on opinion colored by a worthy enthusiasm.

From the point of view of broad educational doctrine, it would seem that Professor Henry Johnson's statement is discriminating and helpful. "The place of history in the curriculum should be made dependent primarily upon aims which can either be realized in no other way than through historical instruction, or which can be realized through historical instruction in a higher degree than through any other kind of instruction. The pursuit of aims of this special character may reasonably be expected to promote at the same time other and more general aims, but the latter should be regarded as incidental, and not equally controlling, if there is to be any distinctive argument for history." [1] Now all who have thought about the matter are aware of the difficulty when we attempt to formulate the distinctive aims of history that Johnson

[1] Johnson, Henry, *The Teaching of History in Elementary and Secondary Schools*. Macmillan.

has in mind. The difficulty grows out of the great variety of concepts of history that are abroad among thinking people. In the past, history has been called upon to serve many different purposes, hence the varying concepts concerning it.

What, then, is the distinctive function of high-school history upon which its claims must rest?

According to Bagley and many others, the materials of history as taught have very little direct application to the affairs of the ordinary individual; and since human conditions are never exactly twice alike, no one can determine the action needed in the present by the way things have worked in the past. Froude showed by concrete examples how reasoning from historical analogy, when some element is overlooked, leads to conclusions that are known to be wrong. Historical data cannot settle matters. Any one who has read widely in the fields of history can make a personal test of usefulness or uselessness of history. Let him make a definite list of correct decisions that his knowledge of historical facts and theories has enabled him to reach, or mention the number of times that history has proved of direct economic or practical value. No, we must look elsewhere for the function of history; otherwise we shall fail to justify the practice of American high schools.

The function of history in secondary education—hence the ultimate aim in our teaching, according to the committee on social studies of the National Education Association (1916)—is in close harmony with the dominant characteristics of adolescents, as we shall see when we consider the psychological aspects of history teaching. The committee insists that the keynote of modern education is social efficiency and that history and the other "social studies differ from other studies by reason of their social content.

From the nature of their content, the social studies afford peculiar opportunities for the training of the individual as a member of society"; and "unless they contribute directly to the cultivation of social efficiency on the part of pupils, they fail in their most important function." Real history, as distinguished from historical narrative or from "the essence of innumerable biographies" (Carlyle's idea), is rich in social content, because it always represents man as acting and being acted upon by other men; it is this continuous interplay of social forces that makes organized society resemble an organism in the biological sense; and it is out of this constant action and reaction that the laws of social life emerge, laws which the socially efficient always appreciate and recognize in their conduct.

The term "social efficiency," as used in educational circles during the past decade to express the ultimate objective, seems to be broad enough to gain assent from nearly all writers; and seemingly all who have attempted to define "social" in this connection have insisted on an interpretation so comprehensive that the term is made to include practically every desirable attribute, as judged by all forms of human contact. In other words, "social efficiency" is a very acceptable and convenient educational slogan; but as now used, it is so inclusive that it has lost its *efficiency* as a means of expressing anything very definite. Hence any one who continues to speak of social efficiency as an educational objective must, if he really says anything, come to quarters and say definitely what particular kind of efficiency—civic, economic, industrial, cooperative,—he has in mind and proceed to tell how his form of efficiency may be obtained; that is, in terms of school subjects, he must return to a definite consideration of content and method.

In 1922, a commission of scholars representing all the high-school social studies, in an attempt to express definitely the aim of these studies, issued this statement: "The purpose is to enable our youth to realize what it means to live in society, to appreciate how people have lived and do live together, and to understand the conditions essential to living together well, to the end that our youth may develop such abilities, inclinations, and ideals, as may qualify them to take an intelligent and effective part in an evolving society." Because history, as now understood, is a record of how people have lived and dealt with one another, it would appear that this statement of the purpose of our social studies may be taken as a reasonable and worth-while aim in the teaching of high-school history and that all subject matter and the method of presentation must clearly contribute to the purpose set forth by this commission.

But since history is to be made to function helpfully in our complex present-day private and public life and since high authorities, as we have seen, are skeptical concerning its direct utility as an informational subject, this brief comprehensive formulation can hardly dispose of the whole matter of function and consequent aims in the teaching of history. Unfortunately the case is not quite so simple, and for practical reasons it requires a fuller statement. At this point many thoughtful historians and educators come to our aid.

When analyzed and reduced to their simplest terms, the values of history that we should be willing to accept are largely the values that Inglis calls conceptual. This may sound like mere theorizing, something to be avoided in a book that aims to be constantly practical. Inglis means that history, when well taught, tends to develop in high-school pupils new ideas, attitudes, interests, and ideals relative to their innumerable social

relations and responsibilities. What are some of the conceptual values on which we may hope to agree?

James Harvey Robinson argues convincingly that history "tends to free our minds" from all sorts of prejudices and preconceptions "so as to permit honest thinking." The study of history does this "by revealing the origin of many of our fundamental beliefs." In the interest of straight thinking it is necessary to expose the origin of our prejudices, which we are all wont to treat as fundamental principles, because, "as we grow up we simply adopt the ideas presented to us in regard to such matters as religion, family relations, property, business, our country, and the state." By reason of this unconscious absorption of our intellectual, moral, and social environments, our real reasons for thinking as we do "are concealed from ourselves as well as from others." [1] Since the real reasons for our prejudices and predilections are largely historical, it is naturally an important function of history to expose their origin and thus free our minds. Certainly it is the duty of society, through some of its institutions, to do this service for the oncoming generations of youth, since they are in no way responsible for the prejudices which they have unconsciously imbibed.

Not only do we value history for its correcting influence, as just explained, but we value it for its expanding influence. The human mind has developed step by step with advancing civilization. So close have been these parallel evolutions that one may raise the academic question as to whether civilization is the cause of the human mind as we know it, or mind the cause of civilization. Whatever the relation, there is a close and significant agreement between the story of civilization and the history of the human mind as found in intelligent individuals. This seems to lead

[1] Robinson, J. H., *The Mind in the Making*. Harper.

to the conclusion that, if we choose significant materials from the records of past civilization and present these data with their present-day correlations to high-school pupils whose minds are developing along lines similar to those along which civilization has moved, the process must act as an expanding influence. If history is to function thus, we must choose from our complex present-day life the elements that we wish to correct or the elements that we wish to reinforce, as the case may be, then find in the past their proper historical antecedents and trace in the most simple and direct way the connections. This would seem to be the natural way to develop in the pupils what the experts call historical-mindedness. It is not here maintained, as has so often been done by history enthusiasts, that the past furnishes ready-made precedents for the present; history never fully "repeats itself." But the help comes, as Professor Robinson has pointed out, from the fact that our thinking and conduct are based upon an understanding of existing conditions as founded upon a knowledge of the past.

It will be helpful, too, to keep in mind that an important function of teaching history is to reënforce and expand, from the records of the past, the principle of development which the pupils gain from their study of the biological sciences. This means that we are to use history of the scientific type and to place emphasis on the humanistic elements. "From this point of view," as Johnson says, "nothing either is or was; everything either was or is in a continuous process of becoming. Here then is a conception that renders history not only unique but indispensable, and makes clear at once the most fundamental and the most comprehensive aim that can be formulated for historical instruction, namely, to make the world intelligible." [1]

[1] *Op. cit.*

Johnson here means the social and political world, using social in its broadest sense. Since history, as now understood, presents concretely human beings living together and variously performing their social and political functions, it would appear that historical instruction and training can, in a way peculiar to itself, be made to contribute to an understanding of the world of human affairs. Out of this treatment of the historical past and the present as developing fluxes, comes, among other important implications, the principle that in human society there is no definite dogmatic solution of problems, but that in the long run real social and political progress has come through co-operation, just as in the biological realm the success of any organism comes through the harmony and coöperation of all its parts.

The three uses of history last considered might be classed as interpretative functions; they are so classed by Professor Bagley and others. Training in history leads us to view present situations "through a vista of events that have led up to them and of which the existing situations are the culmination." [1] The emphasis now placed on causal relations helps to furnish the perspective needed for the interpretation and solution of present-day problems.

These appear to be the most distinctive conceptual purposes. There are other purposes of a more general nature which are usually mentioned in discussing the aims of history teaching; they include developing judgment relative to the time and the sequence of events, a critical and discriminating attitude in dealing with data, a constructive historical imagination, broader social outlook, deeper insight into human relationships, and national and universal ideals.

The recognition of the functions of history discussed

[1] Bagley, W. C., *Educational Values*. Macmillan.

in this section is a logical part of the process of determining suitable content and arriving at effective methods of presentation.

IV

In his book on the teaching of history, Mr. Johnson begins his discussion of the aims and values with the statement that "the aims of instruction determine for any subject the materials to be selected and the manner of dealing with them." [1] It seems hardly possible that this thoughtful writer intended this as a complete statement, unless he meant to include among the aims of instruction meeting the interests and needs of the pupils. Surely sound educational theory must include the principle which Professor Bagley thus expressed many years ago: "Mind interprets impressions from the outer world, not according to their intrinsic nature, but according to their relation to the needs of the organism." [2] He classified these as (1) primitive needs, which correlate with the fundamental interests and tendencies, and (2) acquired needs, which correlate with those adjustments and modifications made necessary by changed conditions of human life.

It is because of the vital nature of the doctrine here enunciated by Professor Bagley, and generally accepted in recent educational discussions, that the chapter on the adolescent intellect is made the basis of discussion throughout this book. An attempt was there made to describe the mental characteristics that should guide the selection of subject matter for high-school pupils and determine the method of its presentation. This is always important; but when dealing with the materials and methods of teaching history, the importance would seem to be greatly increased, because of the nature of the subject. History concerns itself entirely with

[1] *Op. cit.* [2] Bagley, W. C., *The Educative Process.* Macmillan.

human beings and their relations with one another; and as already emphasized, adolescence is dominated on the spiritual side by a new social consciousness. All things human come to have a new appeal, and the social horizon widens rapidly. It would be extremely unfortunate were the teacher of history to fail to understand and to recognize in his work these rapidly expanding social interests. The adolescent quickly becomes aware of and interested in the infinite variety which human life to-day exhibits, and he is naturally curious as to how industrial, political, and social relations have come to possess their present extreme diversity. Does not this new social attitude suggest that now is the opportune time to become acquainted with the historical antecedents of this infinite variety? The time is ripe for the present to merge into the historical and for the individual to become appreciative of "the psychic unity of mankind."

It is difficult to understand why Rousseau's Émile did not begin history until he was eighteen. Adolescence is sufficiently advanced at fourteen or fifteen for the individual to interpret his own personality in the light of the adult life into which he is entering; and he is so entranced with the newness of it all that he is eager to understand it from every angle; hence, if skillfully managed, he is readily initiated into the idea of the past functioning in the present. It is in this connection between the present and the past that history gets its vitality as a school subject; the past must be made to point to the living and throbbing present if history is to make a strong adolescent appeal. This communion between the past and the present will give an added sense of reality to both the present, which the adolescent is enthusiastically appropriating, and the past, which he will accept, provided he is made to feel that it helps him to understand the present.

To the above psychological considerations, which emphasize the importance of the adolescent's interest in his social environment as a guiding principle, we should add an apparently contradictory adolescent characteristic. "Wherever the world is young there youth is at home,"[1] is Dr. Hall's terse phrasing. Because of his youthful spirit, the traditions and the beginnings of history are "psychologically nearer" to the high-school pupil than the last election; and the romance of history thrills him. The fact that our knowledge of historical beginnings is often fragmentary and incoherent does not disturb or daunt his enthusiasm.

There is another adolescent trait, doubtless more important for the teacher of high-school history than any other, to which Hall calls attention and upon which he bases his contention that the moral aim in history teaching should be supreme. "Youth enjoys nothing like an unpointed moral, a cycle of events grouped around a great ethical problem. With this stimulus his memory, judgment, and reason work best." Even the youthful devotee of the motion-picture theater applauds vigorously when virtue is rewarded and vice receives its natural punishment. Regardless of the adolescent's manner of life, he is naturally interested in moral issues and in the placing of conduct in the moral balance.

The following criticism by the late Professor Inglis points to the most serious weakness in our high-school practice: the social sciences have "always suffered from the tendency to organize their materials and determine their content and method with reference to the organization of the subjects as logical sciences rather than with reference to the needs and capacities of the pupils and with respect to the situations in life

[1] *Op. cit.*

in which they may use them." [1] The following sections will proceed on the assumption that this mistake must be avoided.

Other controlling psychological principles and considerations will be stressed in connection with the discussions of subject matter and methods which follow.

V

The selection of historical material for high-school pupils is, indeed, a difficult and unsolved problem. We are embarrassed by both the wealth of material and the conflicting principles that have been proposed as guides to our choice. Many intelligent people outside of educational circles are wont to tell us what must be taught if our democracy is to endure. As Principal T. J. McCormack asserts, "The civic and social education of the average trained member of our American democracy has been a life-long process. Yet we assume that in the secondary school it can be given to adolescents *en bloc*." The claims coming from so many sources and the fact that the authors of our textbooks generally have been expert historians doubtless account for the encyclopedic tendencies manifested in so many books intended for use in our secondary schools. Since this is a book devoted primarily to method, only a few guiding principles relative to subject matter will be suggested.

Fortunately, for many years, it has been understood by both the writers and the teachers of history that the "trumpet-and-drum" materials which once constituted so much of history are in no way beneficial. We have ceased, too, to study the personal adventures of kings and nobles and their favorites; the muse of history no longer encumbers herself with ceremony. About the middle of the last century, Thackeray wrote

[1] *Op. cit.*

in *Henry Esmond* "I wonder shall history ever pull off her periwig and cease to be court-ridden? Shall we see something of France and England besides Versailles and Windsor?" Yes, through the influence and example of Lessing, Chateaubriand, Thierry, Michelet, Scott, Thackeray, Macaulay, Carlyle, Green, and many later writers in Europe and this country, these questions asked by Thackeray concerning the content of history seem to be permanently out of date. Instead of mutilated accounts of a nation's life from which the story of the people is omitted, we now have a relatively complete and well-proportioned record of those things that have affected political, industrial, and social progress and, most important of all, that are significant in the life of the present. Because history has become more nearly complete, it is more artistic, it is more interesting, and it makes a stronger appeal.

High-school history, at its best, includes the phenomena and institutions that are expressive of permanent tendencies and of the developing spirit of the human race; that is, facts are valued when they illustrate historic laws. We have the causes and the effects of a war properly assigned and traced in lieu of a minute account of every engagement and skirmish with all the accompanying military maneuvering. The triumphs of peace have found their place. When the monotony of man's earthly existence, the mere living and dying of succeeding generations, is interrupted by the incoming of what appears to be radically new ideas, we have a new epoch in history; but we assume that these thought revolutions, however much they differ from all that has gone before, are always the outcome of man's strivings during all past ages, and we try to trace them to their source. These are the materials and this is the treatment that will make our pupils conscious of the continuous process of development,

the vital unity of the race. This means that the workings of the general human intellect and the common human heart constitute the historian's domain when he wishes to appeal to pupils of high-school age, for these reveal and interpret life.

All who are familiar with adolescent nature through actual contact know that, in order to seize and hold the attention of youth in any field of thought, we must present the normal, positive, constructive elements. Youth does not willingly listen to the sick man's story, and the negative and destructive forces of the world are not in harmony with his prevailing mood. Thus high-school history should present attractively the "years of noble deeds" and make the pupils feel that courage and character working naturally and constructively are at all times significant and beneficent. Carlyle pointedly characterizes one destructive phase of history. "Battles and war-tumults, which for a time din every ear, and with joy or terror intoxicate every heart, pass away like tavern-brawls, and, except some few Marathons and Morgartheus, are remembered by accident, not by desert." For the youth, the note of history must be positive and constructive.

The foregoing means that the history teacher cannot indulge in mere antiquarian book lore. It means, as Hall has said, that "only that is of worth about the past which vitalizes the present." Our writers of history have been aroused from "their somnolent antiquarian busy-work on kippered events and are feeling the force of living ones and learning what it means to get in the study of the present inspiration and interest for assimilating a knowledge of the past." [1] When the writers and teachers of history forego "kippered events" and look for inspiration to the present throbbing currents of life, especially to those elements which are of

[1] Hall, G. S., *Educational Problems*. Appleton.

interest to youth, we get a continuously changing historical content and emphasis more nearly true to life. Present thought is, as ever, struggling with new and unsolved social, industrial, civic, and foreign problems; new and sometimes alarming democratic forces are asserting themselves; and the whole social fabric seems to be working out novel designs. The past merely as past no longer concerns us, and for this reason the modern type of history must be a continuously changing subject. In this way history itself becomes part and parcel of the entire social evolution and not a detached literary fabric subject to the whims of the historian. This tendency to look to the present for historical inspiration is most fortunate for our high-school boys and girls, since, in the long run, under the play of evolutionary forces, the best tends to survive and the worst to perish, and the present should be the flower of the past.

Adaptability to the needs of high-school pupils suggests other considerations relative to content and methods. Historical details should be massed about central incidents and events, as distinguished from the biographical arrangement sometimes dominant in the elementary school; this way of organizing the materials will aid in conveying the impression of historical continuity, which is needed at this time. This fundamental historical principle of continuity will be served still further if the materials are dominated by action. Johnson thus states the principle: "All that is necessary is to present action following action, to make the story of action a continuous story, to give it a beginning, a middle, and an ending, and to apply the same principle to a series of stories." [1] Sometimes the idea of action can be heightened by dramatization. The principle of action or movement always

[1] *Op. cit.*

involves the idea of cause and effect, a conception that appeals to adolescents. For practical reasons, we should seize upon historical movements that have a close natural unity of their own, since the unity of an incident or a part is felt by pupils long before the unity of history as a whole; the latter is a plant of slow growth.

In history the matter of organization is both difficult and important and must be determined by educational ends. As Robinson intimates, whoever deals with human affairs has to do with subject matter "far more intricate and unmanageable than that of the natural scientists." Because of the meager preparation of many teachers of high-school history, the order of procedure will for the present be determined largely by the textbook in use; it is hoped that the foregoing discussion will aid in organizing collateral reading and possibly have its influence in choosing a textbook.

VI

Dr. Bourne is doubtless right when he says relative to history that, "upon method of teaching there is less agreement than upon questions of program, although for the attainment of the aims of the subject an effective method is more important than the choice of any particular period of study";[1] and Dr. Hall was thinking of method when he proposed the teaching of history in secondary schools as a "new and important field of original research" for the most advanced university graduates, a line of effort that would contribute more toward the intellectual well-being of the oncoming generations of youth than any antiquarian delving that has yet been undertaken. The lines of advance could well be the same as those followed in the recently published course for the state of Pennsylvania. Dr.

[1] Bourne, H. E., *The Teaching of History and Civics*. Longmans, Green.

J. L. Barnard, an active member of the committee on social studies, in describing the course, says, "There is a distinct recognition of the various psychological stages through which our young citizens are passing, with corresponding adaptation of both content and method." Johnson expresses his faith in method by saying that he "has been led step by step, through direct experience in the classroom, to a conviction that history of almost any kind can be taught at almost any stage of instruction on the simple condition that it is taught in a sensible way." [1] It is the purpose of this section to make suggestions concerning method, and the principle of adaptation announced by Dr. Barnard must point the way.

If we are to be true to the nature of high-school pupils, there must be variety of method in presenting the infinite variety of historical materials. In a subject like history which deals with the complexities of human life in all its phases, we must never lapse into the practice of merely telling the pupils what to do, afterwards testing them to find out if they have done it. Although there may be some form of recitation best suited to the history teacher's art, every method of classroom procedure thus far considered should at times find a place in class. Variety is always stimulating.

In France and Germany the spirit and work of the teacher seem to be dominated by the motto, "Come let us study and reason together." In these countries the history teachers *teach*, and they are well prepared for their task and appear to enjoy it greatly. The American teacher is probably not ready to take over the European method, but he may well be animated by the spirit and guiding principles which control this method. At all events, the developing social instincts

[1] *Op. cit.*

very definitely point in the direction of a method that is both coöperative and inspirational. This psychological consideration has led many teachers to the conclusion that the recitation should be of the type now called "socialized"; the same consideration has induced others to use some form of project or problem method. These will be discussed later. However, if reasoning together expresses the spirit and the practice of the history recitation, the teacher must be well informed, ready, and enthusiastic concerning things to be reasoned about. If there is a sound basis of knowledge, discussion adds interest and clarifies thinking; but there must be accurate knowledge; otherwise, in place of real discussion, there will be callow debating and quibbling, and both teacher and pupils are likely to be deceived into thinking that judgment and independent thinking are being developed.

When most of the world's history was in the making, the masses gave very little thought to public affairs; these matters were controlled by the people of wealth or their representatives; the politicians and statesmen were the only ones who were called upon to study the affairs of state. Since all this has been changed and men and women in general have become responsible for governmental well-being, the idea has arisen that the records of important political movements and party reorganizations constitute the kind of history that will be most helpful. The pomp of kings, presidents, and cabinets yield the field to the discussion of party platforms and policies and the results of important elections. But this change in emphasis does not seem to have brought the desired political wisdom; moreover, this kind of teaching has not made a strong appeal to high-school pupils; it is too far removed from life as they know it. Although it deals with human affairs, to them it is not humanistic. If history

is to have an air of reality and appeal to our youth, it must have its basis in the concrete non-political aspects of civilization, the rise and development of the social mind, the economic changes, and the inventions that made them possible. These humanistic elements, when properly emotionalized, fix and hold the attention of adolescents; and at the same time they furnish the illuminating background and supply explanations for political movements. It is here that we find the real foundation and motive forces of civilization. Here the pupils get a deeper insight and form a truer perspective of human development. They learn that the quiet, unobtrusive, everyday movements by which they are surrounded are the constructive forces of life. They understand Carlyle's beautiful and forceful figure: "When the oak is felled, the whole forest echoes with it; but a hundred acorns are planted silently and by some unseen breeze."

To be more specific, history must embody the remote but real causes and conditions from which the recorded momentous events were evolved. If pupils are made continually conscious of the organic unity of history, then great national awakenings, revolutions, and disasters will not appear abrupt and without adequate explanation. The old history taught events without lives. Man was little more than an abstract concept. The different ages and races were slightly distinguished. The new history, on the other hand, attempts to write and teach the great organic drama of a nation's life as it was lived; a nation is a vital social organism.

Taine's statement in his *History of English Literature* helps us to appreciate recent tendencies, first in the writing and later in the teaching of history. "Genuine history is brought into existence only when the historian begins to unravel, across the lapse of time, the living man, toiling, impassioned, entrenched in his customs,

with his voice and features, his gestures and his dress, distinct and complete as he from whom we have just parted." This is an ideal urged by a distinguished French historian, critic, and philosopher of the last half of the nineteenth century.

But this is only the first step. It is not enough to reproduce the mere externals of a race considered as a unit. We must reach and make contact with the man invisible; we must know the inner man concealed beneath the outer. When we become familiar with the habits and tastes, the state of refinement, the practical economy, the degree of energy, and the mode of thinking of a people, we enter upon avenues which lead by converging paths to the real, the inner life of the race. Here we arrive in a new world with its endless associations and complexities; here are the sensations, the reasonings, and the emotions which underlie and explain all the rest. This is reasoning from effect to cause, which is not always easy. But we must know the inner man before we can comprehend his acts; we must know the nation's inner life before we can understand its history.

Greek history is usually placed early in the curriculum. According to modern conceptions of teaching history, what does the alert and imaginative adolescent find? He finds men half clothed in the gymnasia, with strong, nimble, graceful bodies, living under a glowing southern sky; a people surrounded by the most varied and beautiful landscape, daily listening to the flow of instructive eloquence that comes from the orators in the public squares and to the inspiring conversation of the philosophers in the groves and academies—men exercising and discussing, cultivating both mind and limb, attended by slaves, indolent but temperate, intent upon making most beautiful their bodies, minds, temples, and city. The teacher of history leads his

pupils to recognize, in the Greek, the elegance and grace, the lively fancy, and the natural and cultivated tastes, by showing them the influences under which the Greek mind was developed and the products which emanated from it.

By continually recognizing the cohesion and continuity in the life of a race or nation and by selecting and emphasizing only those elements in the story of the past that are expressive of this continuity, the teacher of history invests the past with an atmosphere of reality. In the minds of the pupils the historic current moves forward somewhat as did the living current. This is not brought about primarily by an intellectual appeal, as all familar with adolescent nature know; the appeal is largely to the emotions through the imagination; the pupils sympathetically live through the significant experiences of past peoples. This appeal to the historic imagination is made by much the same method that the historical novelist employs. The language of the text and the teacher is, in the main, concrete and suggestive; the mere enumeration of well-selected events accompanied by a correct chronological table will not create vivid images of the past. These images must of a psychological necessity have their material and spiritual basis in the past and present observations and experiences of the pupils. This demands insight and resourcefulness on the part of the teacher. He must supplement his use of "winged words" with all the significant and suggestive material helps that the school and the locality provides. On the use and effectiveness of each of these material aids a chapter might be written. Well known to alert teachers of history are the past life of their own community and its accessible monuments, historic relics, models, maps, charts, diagrams, photographs, lantern slides, stereographs, moving pictures, and, best of all,

such diagrams and hasty drawings as the teacher or pupils may place on the blackboard while the narrative is in progress. These with the observations and experiences of the pupils furnish the material basis for reconstructing the larger past and giving to it an air of reality; they help, as Wayland expresses it, "to connect the yon and then with the here and now."

Experienced teachers of history have claimed that, in their efforts to make the past real, much help has come from the use of source material; and the question of its use with high-school pupils has been under discussion at times since the committee of ten recommended that some use be made of this material. It is maintained that, in addition to aiding in visualizing the scenes of history and vitalizing the story, the source method helps to cultivate an historical attitude and suggests the methods used by historians. Thus far there has not been a sufficient number of experimental tests to prove the efficiency of this method. Mrs. Mary S. Barnes, in *Studies in Historic Method*, reports an experiment of interest at this point. Two accounts, equal in length, of the fall of Fort Sumter were given to pupils of varying ages. One account was that found in the school history; the other was a dispatch from Major Anderson, the Union officer in charge at the fort. Mrs. Barnes found that a large proportion of the older pupils preferred the account given in the military dispatch; the pupils gave reasons for their preferences similar to those that might be expected from adults. Other similar experiments seem to warrant the use of source materials. However, if the aim of historical continuity is to be realized with high-school pupils, the major part of the reading material must be a closely woven narrative. Scraps of source material may occasionally decorate the historic web, but it must have more cohesion than can be secured by bringing to-

gether original materials, however well they are selected. After explaining five practical ways of using source materials, R. M. Tryon reaches the following conclusion: "The safe and sane attitude toward the use of sources for the high-school history teacher to take is that they are adjuncts to good textbook work and, as such, have an important place in junior and senior high-school history teaching." [1] Readers of Johnson's discussion of the source method are likely to agree with this conclusion.

In recent years, competent authorities agree that maps constitute only a small part of the geographic material that should be used in teaching history. Writers of history assume with Dewey that nature forms the setting of all events and that it "enters into the very make-up of the social happenings that form history"; that is, historians believe with Johnson that "the theater of events is a necessary part of their reality. It is in many cases the cause that produced them." Many of our thoughtful writers are "faithful to the interdependence of man and nature." [2]

We are all more responsive than we are aware to the subtle and mysteriously working influences of the natural world that surrounds us. But the effect of natural surroundings is more marked in the race than in the individual. Before the various branches of the great world-controlling Aryan family left their common home on the plains of Asia, all were probably possessed of similar characteristics; but when the westward-moving tide of emigration divided, part going to the northwest to form the northern or Teutonic nations of Europe and part keeping to the south and giving rise to the Greeks and Latins with their numerous descendents, then the work of differentiation began,

[1] *The Teaching of History in Junior and Senior High Schools.* Ginn.
[2] *Op. cit.*

and it has been going on for thousands of years. In the north, where the fiercer phases of natural phenomena supply the material environment, where the land is cold and moist and seems scarcely reclaimed from the sea, where the ocean is wild and threatening, and, as we find in *Beowulf*, the "winter locks the waves in icy bondage," where the mere sustaining of life calls for courage and demands untiring effort—where men are thus surrounded and nurtured, we find them gloomy but brawny, fierce but reflective, boisterous yet sincere; we find them possessed of personal courage, manhood, and self-control; they are aggressive, industrious, energetic. But these nations of the north are wanting in sprightliness, brilliancy, and the more delicate modes of refinement; the spirit of nature, as they know her, speaks through their languages and books in accents harsh but strong and expressive. Their geographical environment has made them.

But what do we find when we turn to the land of sunshine and beauty? Here the soil is fertile, the air warm and fragrant, and the sky clear and beautiful. Here existence is a perpetual delight; nature ever showers fresh gifts upon these "children of the sun." The raging, moaning fierceness of the northern ocean is here exchanged for the laughing, sparkling waves of the southern seas. The nimble thoughts of the people are exquisite and transparent as the air and sky that surround them. Their gestures are quick, their words are highly colored, and their ideas are as varied as the gorgeous landscape whose beauties suggest them. This soft, voluptuous atmosphere is conducive to sweet fancies and poetic dreaming. People thus nurtured make beautiful everything they touch; their language and poetry are as delicate and gay, as soft and flowing, as the successive scenes and seasons which inspire them; arts arise, fair, finished, and self-contained; everything

is characterized by measure, symmetry, and proportion. But, alas! Nature here proves too indulgent a parent. Out of easy, voluptuous living naturally grows discontent; mental subtlety readily changes to craftiness. All is shifting and transitory. Thus have the transforming influences of the different geographical surroundings given to Europe nations as unlike as the scenes and agencies by which they were shaped. The story of a people is psychologically inseparable from their physical environment; consequently geography aids greatly in making us understand the facts of history, because it gives to history an atmosphere of reality.

In attempting to present simultaneously so many elements of history as here suggested, there is possible danger of lack of movement; and unless the story is so managed as to give the impression of progress, interest will not be sustained. Chronological progression in history, to a certain extent, takes the place of the logical sequence of many of the other high-school subjects. As already suggested, there must be action to hold the attention. The impression of movement is a matter of method. It is well to divide the semester or course into teaching divisions; these divisions should be made logically, having each a real unity of its own and covering a natural epoch. This furnishes the larger divisions of the outline, which are always to be kept clear in the minds of the class. When starting work on one of these natural divisions, the teacher should tell the story of the period to the class in a brief form, making it as lively and interesting as possible. This part of the teacher's work is worthy his best effort and should be the result of careful preparation. The teacher of history must be skilled in the art of story-telling. This plan of opening the work on one of the natural units by giving a carefully worked-

out sketch is in keeping with the spirit of the best history teaching in Europe. For this plan there are at least two pedagogical defenses: It is a natural method of obtaining interest, since people of all ages like a story; and it furnishes the comprehensive bird's-eye view that is needed to give the proper perspective and the correct sequence of the events to be studied, making a natural adolescent appeal.

After work has been done on one of the divisions, all members of the class should prepare to give a connected account of the period. If given orally, there will be time for only a few to tell the story; if given in writing, all may have the privilege. Near the close of the work on the period, the story should again be told, this time in its complete form, and colored by all the work that the class has done. This telling of the story will be a splendid test of the efficiency of the teaching and the ability of the class. It is a coöperative effort. This final account should bear evidence of all the class discussions, the conclusions reached relative to all the important problems considered, the special reports given, the collateral reading done, and the illustrative material used. It is a test of appreciation and of ability to think historically as well as of knowledge. This concluding resumé corresponds in a small way to the theses written by candidates for higher degrees.

Between the initial and the final telling of the story, what should happen? To this question there are many answers: no two teachers, unless they are mere lesson-hearing taskmasters, will perform in the same manner; no two periods of history will be treated in exactly the same way; and in no two classes will the exigencies of the recitation, as the work develops, lead to identical treatment in either content or method. Should a teacher discover that his work on any period is becom-

ing stereotyped, he should at once be alarmed. Since the chief factors in determining what he should do and how he should do it are the nature, needs, and capacities of his pupils, his materials and methods can never become settled and definitely fixed. This involves the whole subject of classroom technique as well as method. The following paragraphs are merely suggestive.

Much that was said relative to problem solving in the discussion of science teaching may be applied to the teaching of history. However, the word "problem" can never have exactly the same meaning in the teaching of history that it does in mathematics and science. Professor Tryon's statement as to its use may be taken as a summary of recent discussions. The problem method is "a mode of procedure from day to day which rests essentially on questions, causes, and results as they relate to historical phenomena. It consists in leading the student to see the problems which confronted the people of the past and to solve them as they were solved by the people in the past. The method, therefore, is an informal rather than a formal one. Assignments are made in terms of problems to solve." [1] The teacher makes clear to the class some of the difficulties that the people in a given period had to meet; then the question is raised as to how they might overcome the difficulties. The pupils' task is to find in the textbook or elsewhere the data needed to answer the questions in one or more ways and then to compare their own proposed solution of the problem with the solution by the people whom the problem confronted. Judgment on the part of the teacher is needed as to what suggestions are to be made. Both the nature of the problem and the suggestions and evaluations furnished by the teacher, of course, must

[1] Tryon, *The Teaching of History in Junior and Senior High Schools*. Ginn.

be determined by the strength of the pupils. In connection with nearly all periods of history there are certain continually recurring problems; for example, the establishment of satisfactory foreign relations, the raising of money for the use of the government, and the enactment of needed laws and constitutional provisions. The conclusions reached in the solution of a problem are thoroughly discussed by the class as a whole. Interest in problem solving may be stimulated by occasionally citing specific achievements furnished by historical criticism. The benefits usually claimed for the problem method in teaching history are that it arouses self-activity, trains the judgment, appeals to thought power rather than memory, serves as a challenge to individual effort, develops initiative, and prepares for the solution of life's problems. It is part of the preparation of teachers to know the method, the legitimate claims that are made for it, and its limitations. The nature of the adolescent intellect seems to suggest the occasional use of the problem-solving approach to carefully selected epochs.

In 1887, Professor A. B. Hart published an article on "How to teach History in Secondary Schools," in which he argued in favor of the topical method; and in 1893, the Committee of Ten resolved that the study of history "by topics be strongly recommended, as tending to stimulate pupils and to encourage independence in judgment." These and other influences brought about a movement in favor of this method. A study made in 1915, a summary of which was published in the *School Review*, showed that one hundred and sixteen out of one hundred and thirty-five history teachers were making an extensive use of the topical method. The method has been much discussed. These are the claims generally made for it: (1) It places more responsibility upon the pupils, thus developing initiative

and giving training in the organization of material. (2) It encourages the use of imagination and reason, since all events must be related in thought to some big event or movement. (3) It makes for the arrangement of events in their logical order; hence they are more readily learned and remembered. And (4) when one general topic in connection with any historical movement or period has been taught thoroughly, other topics are easily connected and taught. Many teachers follow a plan somewhat similar to the following suggested by Professor Tryon; after the story of the period has been learned, the class deals with such topics as social development, industrial progress, commercial development, foreign relations, and political movements. The general topics will naturally vary with the age of the pupils and the country under consideration; topics like the foregoing are better suited to American than European history. The use of the topical method practically implies the use of other books and materials besides the regular textbook; yet no plan should interfere with training in the use of a textbook. In general, the more advanced the pupils, the more suitable to their needs and capacities is the topical method.

Whatever method dominates, nearly all teachers of history at times demand special reports based on independent study and investigation. Such reports deal with well-defined topics or problems, and they may be the results of studies extending over days and weeks. The teacher must make sure that the topic or problem is kept clearly defined in the mind of the pupil. When the work is done vigorously, there are many benefits derived from this form of effort, such as training in selecting, evaluating, and organizing material, experience in meeting definitely placed responsibility, and practice in responding to an audience

situation. In making the report to the class, the pupil should follow a well-organized outline arranged in tabular form. When the report is to be of considerable length and importance, the outline should be submitted for criticism. In the interests of both the class and the pupil reporting, the report must have other qualities besides accuracy and logical arrangement. The pupil must aim to be as interesting as possible; for if the class is bored, the report is worse than a waste of time and should be given in written form. These reports may serve many purposes: adding information, placing special emphasis on certain phases of the work, bringing before the class the results of the most recent research, and making concrete some abstract historical principle found in the text. The effectiveness of special reports depends greatly upon their being brought in at the most opportune time to serve the interests of the whole class. In assigning such work, the teacher should be governed by the interests and capacities of the individual pupils; a pupil unable to make a report interesting should not be asked to make it orally. It is well to encourage and, in some cases, to require the class to take notes on reports; but when note taking is required, it must be for some apparent specific purpose other than mere practice.

VII

In the use of the class period in history, as in other subjects, several types of recitation are well suited to the work, the type being determined by the maturity of the pupils and the purpose of the teacher. The forms of recitation usually discussed in books on the teaching of history are: (1) textbook recitation in which testing is the chief aim, (2) topical or question recitation, (3) review and drill recitation, (4) socialized recitation, and (5) a combination of recitation

and lecture method with the emphasis varied between the pupils' part and the teacher's lecturing. The last-mentioned type is especially well suited to history, a subject so broad and so much in need of proper coloring; but the loquacious, well-informed teacher must exercise self-restraint in the use of this form of recitation and divide the time according to the task to be accomplished rather than according to his natural proclivities. The correct division of class time between teacher and pupil activity has not been standardized, nor can it be profitably standardized where so many human elements are involved.

In calling upon the pupils in class for their part of the recitation, how shall the teacher proceed? This involves the whole art of conducting a recitation; but, because of the nature of the subject matter treated, history is well suited to both the topical method of study, as we have seen, and the topical form of recitation. However, the pupil unaided will seldom be able to exhaust an assigned topic, and he will need help from the teacher in the form of skillfully framed questions; the number of questions needed to draw out all the pupil knows on any topic will depend largely on the quality of the questions. On the whole, the effectiveness of the questioning process, which is the procedure most commonly used to stimulate the pupils, depends upon the number of direct and double questions, the proportion of memory and thought questions, the degree to which the teacher holds to the main object or problem assigned, and, most of all, the insight and skill that the teacher exercises in fitting the questions to the capacity of the individual pupils. Since "man is explicable by nothing less than all his history," the varied nature of the materials of history give great scope to the skill and ingenuity of the teacher in the matter of framing and placing his questions.

The history recitation is rich in opportunities for training in effective grouping of facts. When some form of the topical method of study is being used, the facts are grouped according to kind, as determined by the phase of human activity to which they belong; then each group is arranged in chronological order. This leads to orderly thinking, provides helpful associations, and suggests to the pupils causal relations that they may be able to trace for themselves instead of reciting ready-made statements of causes and effects. Pupils need much help in this phase of the work, and the classroom is the place to give it.

Pupils are always in need of suggestive treatment when they are called upon to discover general principles. History, which is a record of human social activities, should make its contribution to the development of the principles that underlie and grow out of these activities. With pupils of high-school age the only effective way to teach any general principle is through concrete situations. There must be in mind a number of such situations from which the pupils may generalize. It is at this point in the study of history that the pupils need suggestions; and the class period, where there is an opportunity for socialized effort, is the natural and convenient time to guide the pupils' thinking toward social principles that are likely to prove significant in the years to come. Interest in the past and appreciation of the underlying principles of its development must be stimulated frequently by causing the pupils' thinking to begin with some present situation involving the same history-forming processes as the period or phase of history under consideration. This connecting of the past with the unfolding present can best be done in the classroom where the thinking of the pupils is under control. To make the study of the past fruitful, it is often necessary to quicken the pupils' sympathies

and moderate their judgments; but as far as possible, this must be done in such a way as to keep the outcome problematic, since a hasty passing from the concrete to the abstract is as barren a process as presenting ready-made principles.

The way the class period is divided among the various kinds of recitation will vary from day to day. In history, perhaps more than in other school subjects, it is important that a few minutes at the opening of the lesson be used for reviewing the previous work—in the interest of close continuity and historical sequence. This part of the work must be brief and confined to events or movements that introduce the present lesson. There is need, too, of a summary at the close of the day's lesson for the purpose of placing the events studied in their proper perspective.

Very often the most helpful part of the teacher's work is the assignment of the next day's lesson. The assignment must be definite enough to make clear in the minds of the pupils the principal objective; yet in general it should be kept problematical. It may be a definitely formulated problem, or it may take the form of a few thought-provoking, pivotal questions, requiring thinking as well as careful reading on the part of the pupils.

As in the teaching of other high-school subjects, the teacher of history is ambitious to have the knowledge imparted and the training given in his classes function in other subjects and in other fields of activity. His success will depend very largely upon the methods he uses in dealing with historical materials and the degree to which he is able to make his pupils feel that these methods are extensively usable intellectual tools. His pupils must form the habit of selecting and retaining only organizable historical facts, and they must be familiar with the various effective ways of

organizing the data which they select. This statement sums up what has been said thus far concerning content and method, and it has pretty general application to other high-school subjects. But Inglis has called attention to how the problems of transfer in the case of history differ from these problems in other school subjects. "In the case of most studies for which transfer values are claimed or desired the problem involves the application of improved efficiency acquired in connection with content of one kind to content of a widely different character. In the case of history, however, there is a vast field for the application of improved efficiency gained in connection with specific social data studied to other social data not studied. In other words, the improved efficiency is to be employed in connection with content and situations of the same or relatively similar character." [1] History always deals with human situations; and, in the life experiences of most individuals, human situations are by far the most numerous. The teacher of history hopes that his pupils will carry into practical situations of life well developed social and political sensitiveness and trained judgment. They must not hold the belief that social and historical problems admit of definite solutions as do problems in mathematics or science. As Principal McCormack expresses it, the teacher hopes to inculcate "some sort of constructive political imagination, some sort of reflective and social power." If in this he is successful, he contributes richly to both the practical and the spiritual wisdom of his pupils.

[1] *Op. cit.*

CHAPTER XI

CIVICS, ECONOMICS, AND SOCIOLOGY

Because of varying usage in recent discussions of the secondary-school curriculum, there is uncertainty as to the correct title of this brief chapter. Should it be named "Social Sciences"? The question seems to turn on whether history should be classed as one of the social sciences; if so classed, "social science" would include the preceding chapter. If one uses the term "social studies," which has come into vogue during the past few years, then history finds its place in this group without question, since the newer term from the first has included history, geography, civics, economics, and sociology. When a commission of scholars representing the special subjects of the group made its report a few years ago, the use of the term "social studies" received confirmation, and the unifying principle dominating the subjects involved was given increased recognition. If history is not classed as a social science, then we may fittingly say that one of its important functions, not mentioned in the preceding chapter, is to furnish the background, the concepts, and much of the terminology for the social sciences.

It is the purpose of this chapter to continue the consideration of high-school studies that pertain to human relations and human well-being, the social subjects that have found a place in the curriculum; these subjects, in the order named, deal with the methods and the machinery by which the welfare of society may be attained, the principles underlying the

material welfare of man, and the principles involved in man's social welfare in the broadest sense.

Recent discussions of social studies, as well as several official utterances, indicate that there is a growing tendency toward combining civics, economics, and sociology into one course and giving this course a permanent place in the last year of the senior high school. This attempted correlation of the social sciences is justified, it is maintained, on the ground that in actual life the underlying principles of these sciences cannot be disentangled. The conditions and problems involved, as they must be met by the individual, are too intricate and complex to be classified and treated under the old captions. Although the purpose of such a combination course is pretty well defined and although there is considerable agreement relative to how it should be taught, the content is far from settled; and generally the new textbooks are made up of parts or chapters quite similar to those found in the old books; that is, the integrating process demanded by recent theory is far from complete. However, whether these studies are taught to pupils in the later years of middle adolescence as one subject or as separate subjects, the present discussion applies, since the purposes and underlying principles of the subjects are sufficiently alike to warrant the assumption.

It should be noted that what has come to be called "community civics" is not here included; this subject is commonly placed in the junior high school or in the first year of the senior high school; and because it is taught to younger pupils, the method of presentation must be different.

I

The dominant adolescent interests, especially those controlled by the strong social instincts of the period, seem to point clearly to the later years of the high

school as the time psychologically suited to the teaching of the principles that underlie all common social and political relations. Gaining a usable body of knowledge is not the most important aim in the teaching of the social sciences. The committee on social studies of the Commission on the Reorganization of Secondary Education thus states the case: "From the standpoint of the purposes of secondary education, it is far less important that the adolescent youth should acquire a comprehensive knowledge of any or all of the social sciences than it is that he should be given experience and practice in the observation of social phenomena as he encounters them; that he should be brought to understand that every social problem is many-sided and complex; and that he should acquire the habit of forming social judgments only on the basis of dispassionate consideration of all the facts available." [1]

From the point of view of this book, it is gratifying to note that the committee's statement on the whole implies a psychological arrangement and treatment of the subject matter of the social studies, rather than an attempt to meet the logical demands of the subjects as abstract sciences. It is also gratifying to note that economics, which has never occupied a very secure position in the secondary program of studies, and sociology, which has not been accepted very generally as a suitable high-school subject, are now receiving unquestioned recognition from both social science teachers and administrators; this is the result of the proposed correlation and the new emphasis upon the social studies. Again, it is gratifying that the scope of civics is no longer confined to the governmental machinery of the nations and the other political units, as during the nineteenth century, but that we are now attempting to study the ordinary, everyday, informal civic

[1] *Bureau of Education Bulletin*, 1916, No. 28.

and social activities of community life, with a view to developing a practical attitude toward all phases of social-civic life. This means that not only knowledge concerning social-civic institutions and relations must be imparted, but that suitable ideals and a sense of responsibility must in some way be built up. There must come out of the study of civics a strong tendency towards rational civic action on the part of individuals, as well as ability to think straight on social-civic matters.

When one contemplates the status of economic issues at the present time, it is difficult to understand why the study of the simpler economic principles and their application has occupied such a precarious position in high-school education. As R. H. Tawney, an English economist, affirms, industry "has come to hold a position of exclusive predominence among human interests, which no single interest, and least of all the provision of the material means of existence, is fit to occupy. . . . Industrialized communities neglect the very objects for which it is worth while to acquire riches in their feverish preoccupation with the means by which riches can be acquired." These facts are not escaping notice; the trend of our business systems is agitating all types of thoughtful men and women. As James Harvey Robinson has said in *Mind in the Making*, "Poets, dramatists, and story writers turn aside from their old *motifs* to play the rôle of economists. Psychologists, biologists, chemists, engineers are as never before striving to discover the relation between their realms of information and the general problems of social and industrial organization." Yet average men and women are continually displaying extreme ignorance of economic laws and often to their undoing come under the influence of exploiters and demagogues. It is fortunate that the emphasis that has recently been placed on the economic aspects of history in many

high schools has made the pupils somewhat familiar with the operation of some of the more common economic laws; from its very nature, economic history, as Professor Dewey has pointed out, is "more human, more democratic, and hence more liberalizing than political history." [1] The proposed integrated fourth-year course in social studies is to be a *sustained* effort to inform and train pupils in matters that pertain to civic, economic, and social welfare; the success of this effort, as with all efforts to influence the thinking and ideals of adolescents, will depend very largely upon the degree of skill that is exercised in selecting and making apparent to the pupils the distinctly *human* significance of the subject matter used in the course. In this way the present interests and needs of the pupils will best be served.

II

What aims and principles are to control the method of dealing with the social studies, combined or separate?

As in the case of all new proposals, the aims are decidedly ambitious. The Pennsylvania program aims to make its culminating study in the social sciences a training in initiative and in the power "to investigate, to reason, to compare, to judge" in all affairs where human relations are involved; and to this general training, it is proposed to add "specific training in the problems of American democracy." All attempts at defining these aims make the point that it is to be a direct attack on the problem of training for social efficiency; and this end is to be accomplished "through the development of an appreciation of the nature and laws of social life," using social in its broadest sense. Moreover, there is to be an "energizing of the ethical point of view." Then there is the further aim of overcoming all the social prejudices of the pupils, such

[1] Dewey, John, *Democracy and Education*. Macmillan.

notions as they have unthinkingly absorbed from their social environment, the echoes of "the voice of the herd." With all of us these prejudices are much more numerous than we think; and they pertain to such important matters as property rights, national honor, patriotism, traditions, and religion. This surely is an important and ambitious aim, since, to accomplish it, it is necessary to break through and dissipate an "emotional blockade"; as pointed out by Robinson, the blockade behind which most of our preconceptions and prejudices are entrenched can be demolished most effectively by explaining historically the source of any particular belief or prejudice, thus making the muse of history the handmaiden of the social sciences.

Turning now to the principles that should control the teaching of the social studies, we can safely assert that the treatment of this group of studies is greatly in need of psychological guidance. This statement is based on the thought that both the content and aim of these subjects are in a peculiar and vital manner well suited to the interests, attitudes, and needs of adolescents. This being true, it is well to recall these interests, attitudes, and needs. On the intellectual side, there is an increased power to analyze and reason; the adolescent enjoys logical thought processes, and he is often critical and aggressively argumentative. On the moral side, the youth is altruistic and idealistic, thinking of himself, it is true, but generally in relation to others, his outlook being heterocentric. Yet, with all his idealism, the adolescent is rapidly becoming interested in the practical phases of human affairs; his approaching responsibility stimulates in this direction. On the social side, boys and girls of high-school age naturally seek to gain their ends and obtain their satisfactions through associations with others of their own age. The rapid growth of social consciousness,

which has its origin in the social instincts described in Chapter II, is doubtless the most obvious of all the psychological characteristics of adolescence. These adolescent traits are rich in suggestions concerning both the material to be selected and the method to be used in the social studies.

In the twenty-second *Yearbook* of the National Society for the Study of Education, there is a comprehensive survey of the present status of the social studies and many splendid proposals as to their future development. The chapters are written by ten or a dozen of the leading educators of the country and seem to be the result of mature thinking. But in the matter of both content and method there is in several of the chapters a serious neglect of the adolescent point of view. Social values are fixed by adult standards, and we are to look to adult society for our materials. The learner never appears to be the determining factor in the selection, organization, or presentation of the materials. As Judd warns, we must not repeat the mistake that was made when the nature-study movement began by selecting materials from the mature natural sciences regardless of the children's interests and immaturity, wholly oblivious to psychological considerations. As urged a generation ago in the *Report of the Committee of Fifteen*, better let "the point of view of the child be forced upon the philosopher."

III

In the matter of method, what does the point of view of the adolescent dictate?

1. The youth enjoys turning his developing intellectual powers on all sorts of situations in which human relations and conduct are involved; and we may safely assume that, when the thinking is properly directed, he does this with much profit as well as satisfaction.

The method of approach generally should be inductive, for much of the data can be readily educed from the observations and experiences of the pupils. The teaching is thus made concrete, hence meaningful and well-suited to affect conduct. Not only are fundamental principles discovered in concrete situations, but they are also tested by applying them to actual conditions, conditions often found in the local community. In this way there will be no opposition between theory and practice; the pupils are continually reminded that principles are merely careful generalizations of facts. For the alert teacher, there is to be found in the civic, economic, and social realms of the adult surroundings, but especially in the adolescent environment, ample material on which to exercise the pupils' growing powers of analysis and ability to generalize. If the pupils' interests and powers guide us, the treatment will be neither encyclopedic nor dogmatic; the materials chosen will be organizable, and the spirit and methods of the Greek agora will prevail. All this is dictated by the youth's intellectual proclivities and by the nature of the subject matter that should make up the social sciences.

2. The splendid idealism of youth should be made to function continually in the building up and shaping of civic, economic, social standards; and youthful altruistic instincts must supply the foundation for the desirable personal adjustments of the pupils to their civic, economic, and social responsibilities. Without being sentimental, the work of the classroom must in some way be emotionalized if it is to bear fruit. This can usually be done by appealing to the imagination, by visualizing concrete civic and social situations, and by projecting into these situations natural adolescent values and ideals. The social sciences are peculiarly rich in materials with which to appeal to the altruism

and idealism of youth; and if the methods employed do not make this appeal, we cannot on practical grounds justify their place in our high-school curricula.

3. But as already indicated, the adolescent is not only idealistic in his outlook, but he is also readily interested in the practical aspects of affairs; and it is to the practical application of civic, economic, and social principles that we must ultimately lead our pupils. This means that the pupils must somehow be led to understand and evaluate civic, economic, and social institutions and relations as they actually are; and on this accurate evaluation, they must be led to work out some practical principles and to assume an aggressive attitude toward their human environment. This recognition of adolescent practical interests naturally includes a consideration of vocational needs. This instinct to act in practical ways suggests that provision be made for action, and action based on independent thinking and carrying with it some real consequences. The new philosophy of education, which Professor Dewey has often stated in a masterly way, demands such activities and such organization of the school life that the pupils may continually live a natural life in a miniature society; that is, the school affords constant practice in civic, economic, and social living. The opportunity to judge and act and stand by the results is provided in the modern high school by the many extracurricular activities. Thus there seems to be a most natural correlation between the work of the classroom in the social studies and all the social activities and organizations of the school. Moreover, the practice in recent years of providing opportunities for pupils to visit council chambers, courtrooms, polling places, legislatures, industrial plants, prisons, and reformatories appeals to the adolescent's practical in-

stincts, and the first-hand data needed as a basis for practical knowledge and judgment is thus fully justified on psychological grounds.

4. The marked social developments of adolescents surely dictate some form of socialized effort, and the materials and aims of the social sciences appear especially to call for an extreme type of schoolroom cooperation. In recent years, this has frequently taken the form of the "socialized recitation" or a "project" worked out by the group. Whatever may be the type of recitation, the method must be social in a very real sense. There must be real discussion to expand and clarify ideas and judgments already agreed upon, to formulate practical principles of action, to justify the application of civic, economic, and social laws to specific problems and cases, and to integrate all the detailed results of reading, observation, and experience. If group thinking and feeling are applied to numerous concrete social situations that are typical, much that is socially practical will be the outcome.

These four deductions from the psychology of adolescence, together with the nature of the social studies, seem to indicate that certain types of recitation should dominate the classroom work. The argumentative propensities of the middle adolescent suggest frequent debates, both formal and informal, the contest aspect of debating giving scope for his self-assertion. The dominant social instincts and the growing desire for coöperation make nearly all group activities profitable forms of effort. This suggests problems and projects that can best be dealt with by some kind of group organization. "Not the learning of texts," Dr. Harold Rugg asserts, "but the solving of problems is what we need. Our materials must be organized around issues, problems, unanswered questions which the pupil recognizes as important and which he really

strives to unravel." [1] It is not necessary from the point of view of adolescent psychology that these problems and projects be definitely classified as civic, economic, or social. The discussions and solutions may well center around some live situation which is very indefinite as to scientific classification. We are not trying to build up logically the separate social sciences; but we are trying to create attitudes and habits of thinking and reacting, and we are giving practice in formulating principles of social conduct, principles that may defy classification. When Socrates wandered forth and met, in the most informal manner, the youth of Athens, he generally discussed problems with them that we would now classify under the social sciences. But he was never bent upon leading his audience to make fine distinctions as to the place that his topics occupied in the Greek system of thought; rather he was intent upon making them do some real reflective thinking and leading them to see the truth under discussion in its many relations and out of it all reach certain workable principles.

The abstract nature of many parts of the social sciences makes it pedagogically imperative that a wealth of illustrative material be carefully selected and freely used. This is especially the case in the development of economic principles and laws. But it is not enough that we search for this illustrative material in the current newspapers, magazines, and political speeches and platforms. Periodicals for adults, both as to content and treatment, are not suited to the interests and needs of boys and girls in their teens. To be really enlightening and appealing there must be a personal element; and this element is found naturally in the experiences and environment of the pupils; hence the community and the organic life of the school

[1] *National Year Book for the Study of Education*, 1923, Part II.

are the pupils' best source books. It is only by continually focusing on pupils' intimate personal contacts with their social-economic environment that the work in any social science can be vitalized.

In the interest of economy, as already suggested, the material used and the problems studied must be representative. A few typical cases with their many ramifications are more clarifying than an encyclopedic enumeration of many supposedly interesting miscellaneous instances. In the words of Professor Dewey, material is typical "when, although individual or specific, it is such as readily and fruitfully suggests the principles of an entire class of facts." By continually passing back and forth between typical concrete cases and general truth, "the mind is defended against the deadening influence of many isolated particulars and also against the barrenness of merely formal principle."[1] The stronger pupils gain great satisfaction in finding clear instances of the general in the particular. No subjects in the high-school program of studies are in greater need of adaptive treatment, and it is by varying the relative amount and kind of illustrative typical material that the teacher is able to suit his instruction to the different capacities of his pupils.

The pedagogical implications of the foregoing discussions are here stated by way of summary.

1. We must so teach that the knowledge imparted will be much less important than the attitudes developed, intangible as this may be. We must so teach that the sense of social, economic, and civic values will be quickened and trained, and standards and ideals of social conduct will be clarified, built up, and reënforced. We must so teach that the combined activities of the classroom and the organic life of the school will

[1] *How We Think.* Heath.

eventuate in conduct conducive to the welfare of both the individual and society.

2. As contributory to the work of the school, the most important part of the pupils' environment consists of the social elements found in both adult and adolescent society, the latter furnishing by far the most potent influences. However, the teacher should bear in mind that the pupils are affected only by those elements in his social environment with which he has either direct or vicarious experience.

3. In determining what materials shall be used in teaching the social science courses, the selective principle, as always, is the needs and capacities of the pupils. The justification of the project-problem method is that it seeks to give concrete expression to the pupils' needs.

4. Because of the interests of adolescents and because of the nature and aims of the subjects, the methods of the classroom should be discursive and informal. Professor Robinson suggests that "we should revert to the dialectic of the Athenian agora and make it a chosen instrument for clarifying, coördinating, and directing coöperative thinking." [1] But in the interest of usable results, the coöperative thinking must be skillfully guided. The pupils must be led to bring the results of their observations, experiences, and thinking into significant relations; the more coherent the series of social relations studied, the more intellectually satisfying and more usable will be the outcome. But if the thinking and the materials are not kept on the social and intellectual level of the pupils, our attempts at scientific thinking will cause us to revert to the abbreviated adult social sciences which were handed down years ago from the colleges.

[1] Robinson, J. H., *The Mind in the Making*. Harper.

IV

If the reader accepts the foregoing conclusions as to the content and the method of presenting the social sciences, he must realize that the teaching of these subjects calls for a preparation and a kind of social experience beyond that of many of the immature girls to whom this work has frequently been assigned. The efforts of immature teachers have been rendered more abortive by reason of the kind of textbooks we have placed in their hands. In the main, these have been abridgments of texts prepared for adults by university teachers, often without any direct contact with the adolescent mind. But now a new type of book in the social sciences is available. The authors of these books assume that our high-school pupils are youthful citizens actually participating in united social action. They aim to illustrate the chief factors and principles of social organization by concrete social, economic, and civic problems. Economic theory is used only when it aids in revealing the distinguishing features of industrial life and community activities. These books attempt to acquaint pupils with the opportunities in the various vocations, they draw on everyday experiences, and they assume that the pupils already have some duties and responsibilities in connection with the world's work.

But textbooks play only a minor part in the teaching of subjects of this kind. The knowledge and point of view demanded cannot be expressed in simple formulas or be hastily bestowed by intensive study of the field involved; for we are here dealing with that intangible, complex thing called society, into a knowledge of which we must *grow* by much thinking based on varied experience. Thus it would appear that effective teaching of the social sciences demands con-

siderable social maturity, such as comes from a constant and thoughtful watching of civic, economic, and social phenomena; and the teacher must learn to view these phenomena, as it were, through the medium of the adolescent intellect and feelings.

The success of the teacher of these subjects is not to be determined by the thinking and conduct of his pupils ten or twenty years hence; but it may be judged by their present growing interest in social-civic relations in the school and the community, by the degree of alacrity with which they seek opportunities to participate in social-civic affairs, by the amount of coöperative skill they are developing, and by the thinking they do and the judgment they display relative to civic, economic, or social situations. In a word, success must be measured in terms of present personal growth, growth which makes for group and community welfare.

CHAPTER XII

ENGLISH COMPOSITION

For about a century, English composition in some form has had a place in the program of secondary education in this country. Since 1890, judging by the percentage of pupils pursuing the subject, it has increased steadily. It seems to be the only subject everywhere required. In the school year 1914–1915, nearly sixty per cent of the pupils in the public high schools were doing work in English composition, with literature the next subject in order of prominence. Since that time, there has been little change in the relative importance of English in the secondary-school program of studies. For the school year 1924–1925, the percentage of pupils in the public high schools of the North Central Association of Colleges and Secondary Schools enrolled in English was 86.3. In the opinion of Dr. Judd, "The large amount of attention which is being given at the present time to English is to be explained as a survival of the traditional devotion to the language subjects." Moreover, the situation seems to be acceptable to all parties in the classical controversy.

Notwithstanding the undisputed eminence of English composition in our high schools and despite the large number of teachers that have in recent years been especially trained to teach this subject, there is doubtless no study in the entire program whose handling represents such extremes of success and failure, as judged by the feelings of both teachers and pupils toward the work. Frequently the teachers of the

English department vie with each other in their efforts to escape this part of the work, and many pupils continually declare that they "just hate to write." For the teacher it is a burden, for the pupil a grind. When considered from the standpoint of its utility or its appeal as one of the arts or as a natural adolescent activity, it would seem that the work in composition should be a fruitful source of satisfaction, if not a continuous joy. No one who thinks the matter through doubts the universal serviceableness of being able to express one's self effectively in language; all art, we are told, should be approached and executed in the spirit of play; and the youth is eager to find ways of expressing himself. Let us turn to the last consideration and see what our knowledge of adolescence suggests.

I

To rehearse the characteristics and tendencies of adolescence is to set forth the instinctive, mental, emotional, and social traits that should naturally furnish an ideal psychological basis for vigorous and joyous self-expression in many forms. The whole doctrine may be thus formulated: Adolescence is rich in content and social in its outlook. Ideas, emotions, character are all swiftly evolving, and complete growth and happiness are dependent upon these finding suitable and adequate expression.

What are the characteristics and tendencies to which teachers of composition must continually appeal? Perhaps the most serviceable is the adolescent's feeling that his thoughts, emotions, and ideals are new and very much worth while. From his intellectual and especially his social awakening comes a vigor, a glow, and an urge that must find suitable outflow. He is doing much thinking and often dreaming on his own account. He has a deep and sometimes passionate

interest in all things that pertain to individuality and to human relations. His mind evolves new doubts, hopes, and ambitions. There are

> *The songs and silence in the heart*
> *That in part are prophecies, and in part*
> *Are longings wild and vain.*

Youth is frequently vibrant with new resolves. Sometimes there is mental and emotional turmoil. There is usually a new emotional attitude toward nature, sometimes scientific and sometimes poetical. It would seem that the adolescent's new interests, tastes, and feelings, his fine idealism, and his intellectual independence should supply both material and motive force for enthusiastic work in oral and written expression. His strong social proclivities are ever prompting him to seek a means of communicating his "great thoughts" and his new feelings. Like other beings, he naturally finds satisfaction in the use of his newly found powers.

Thus it would appear that the psychology involved is decidedly favorable, and that the pedagogy of the situation demands the giving scope and guidance to awaiting powers and tendencies.

To continue our psychological considerations, speech, as Judd asserts, "is a definite and important kind of behavior." Because of the differences in his nature, interests, and capacities, we do not expect the adolescent to behave under many circumstances in the same manner as the child or the preadolescent. Each is expected to act in accordance with his nature and his interests. When he does this, he is happy, and his capacity for adequate and fitting behavior grows and matures. Because of the unity of nature, there should be no serious breach between the use of language and the other practical activities of life. Like other living beings, the youth spends all his waking and even his

sleeping hours behaving in some way; and if all is going well, this behaving is a process of fulfilling and enriching his nature, wherein lies his permanent source of satisfaction. Now the correct use of oral and written language is an act natural and conventional—natural in that it is a means of expressing one's natural thoughts and feelings, and conventional in that the individual must usually forego some of his immediate reactions and yield to the conventions of society. It is in this way that correct speech becomes a perfect instrument of social union and enlarges the social horizon, which should be a strong motive to effort during the years of adolescence. Thus it appears that the teacher of oral and written expression is appointed to incite one form of fruitful conduct, and, as in morals, to guide in lines laid down by the dictates of custom and agreement.

The pupils should realize early that the correct and vigorous use of words is not only socially serviceable, but that their use has a high value when measured by its effect upon their intellectual powers. (1) Words come to be a substitute for direct experience; hence they are needed as a matter of economy. (2) Improved expression inevitably leads to improved thinking, for thought and the expression of thought are but different and interdependent aspects of the same process. Every attempt at adequate expression sharpens the thinking and enriches the thought. Because this interplay of thought and expression and the natural results that flow from it minister to both the intellectual and social needs of the adolescent, the form of effort involved in composition should make a natural appeal.

The purpose of this section has been to show that self-expression is natural to nearly all adolescents who have so many new ideas, feelings, and aspirations about which they are enthusiastic, and that it is a form of

activity that naturally gives much intellectual and social satisfaction.

But, on the other hand, the psychology of this matter, it will be remembered, includes the fact that at this period the receptive and appreciative powers of the mind often exceed the expressive powers. The inward flow of stimuli from the sensory and vital organs at times are confusing, hence disturbing; and the resulting impressions are so great in both number and intensity that the youth cannot give adequate expression, and this sense of inadequacy is a further disconcerting element in his efforts to express himself. These natural obstructions have important pedagogical implications, which will be considered later.

II

The foregoing account of the relation of adolescent psychology to oral and written expression makes it apparent that English composition occupies a unique place in the high-school program of studies. The study of the principles and the use of English is not only one of the important "subjects" of all curricula, but it functions in a vital way in every other educational activity of the school. If the work of the English teacher is functioning adequately, every department must feel its influence and profit by it; complete expression, as has been pointed out, is a means to many ends. This statement, of course, applies to all forms of expression—drawing, painting, modeling, and the manual arts in general; but because of the large and important part that oral and written expression plays in practically all school work, its importance clearly transcends all other modes of expression combined. This claim relative to the place of English composition suggests that those who teach it must be interested in the work that their pupils are doing in the content subjects,

and they must follow it closely enough to make use of some of the materials in which the pupils are already interested. This is a matter of motivation, however, and not now under consideration.

If the psychological considerations already presented are correctly stated, and if the claims made as to the peculiar place that oral and written expression occupies relative to the other work of the school are well founded, the high eminence that English composition has enjoyed during the past generation may be fully justified on other grounds besides that of "a survival of the traditional devotion to the language subjects."

III

The mother tongue is a subject of study in the schools of all the nations, and the aims of this study have been variously stated. An adequate formulation of the fundamental aims of English composition is important, since no subject is more dependent for its success on the attitude of the teacher and the spirit of the classroom; and these intangible conditions for cultivating verbal self-expression are naturally determined largely by the conscious aims of the teacher.

The committee on the high-school course in English, representing the National Education Association, affirms that the immediate aim of composition in the secondary school is "to give the student command of the art of expression in speech and writing." Unfortunately this appears to be the sole aim that controls much teaching of this subject and is based on the assumption that language is merely a means of communication.

A more important aim, because more fundamental in that it goes behind the form to the content, is based on the supposition that language is an instrument and an essential condition of all important thinking. In

the daily experience of the individual, the use of language as an instrument of thought is naturally prior to its use as a medium of expression, and in this way it functions continually. Moreover, nearly all of the intellectual structures which support and carry our higher mental processes for us have been built up, since the race began to think, by the skillful use of language, and these structures have been preserved and transmitted by means of language. Dewey expands this thought as follows: "To be able to use the past, to judge and infer the new and unknown implies that, although the past thing has gone, its *meaning* abides in such a way as to be applicable in determining the character of the new. Speech forms are our great carriers: the easy-running vehicles by which meanings are transported from experiences that no longer concern us to those that are as yet dark and dubious." [1]

From every point of view language is an instrument of thought. The evolution of well-defined individual notions, such as images, abstract ideas, and sentiments, is very closely identified with their proper naming; that is, the verbal symbol and the thing symbolized naturally have a parallel development. This relation between thinking and the expression of thought seems to be a psychological necessity. As previously indicated the thought and the expression of it in actual practice are so closely interrelated that they act and react upon each other, moving along and developing together. There is a causal relation between thought and its expression, and cause and effect continually change places. As elsewhere expressed, "thought kindles the fires of expression, but these in turn set up countercurrents which intensify and clarify the thinking."

Thus instead of composition being fundamentally concerned with "the art of expression," its primary

[1] *Op. cit.*

aim is to cause pupils to grow in the power to use words as instruments of *thought*, the thought being the basic objective. The degree of success in this undertaking will condition and be measured by the pupils' *growth* of power in expressing thought.

Percival Chubb asserts that the highest aim in the teaching of composition is the establishment of "such a command of one's impulses and ideas and stock of knowledge as is evidenced by one's power to give them rational form in language." [1] This seems to base adequate self-expression on adequate self-control; it follows that the teacher's task is to aid his pupils in controlling and organizing their own knowledge, imagination, feelings, and thinking; and this he is to do "through and for communication." This statement of the aim of verbal expression is not at variance with that of Dewey, but it seems to be somewhat broader, in that it specifically includes other psychological qualities besides thought.

If the aims of English composition here set forth are realized, there will be two results, one psychological and the other linguistic: (1) Through his serious but natural effort to express himself accurately and adequately, there should come to the pupil a richer and better organized and controlled mental life, equipped with the accumulated tools of thought; and (2) on the concrete side, there should emerge a clearly and correctly "composed" expression of the pupil's thoughts and feelings concerning any matter under consideration, such a verbal expression as is suited to the interests and capacities of his real or imaginary audience, and measurably meeting the requirements of good form and finish.

Because language and literature are often taught by the same teacher and to the same class and grouped

[1] Chubb, Percival, *The Teaching of English.* Macmillan.

under "English" in the various curricula, their aims are not always definitely distinguished, and there results an unfortunate failure to discriminate as to the values appropriate to each subject and the methods best suited to the character of each. Professor Inglis does not overstate their difference: "However the two fields of study may correlate in teaching, however much they may depend upon and contribute to each other, the values, aims, and methods of the two studies are as widely separate as any two studies in the program." [1] The disparity of values, aims, and methods here asserted will appear when these matters are discussed in the next chapter in connection with the teaching of literature.

IV

It is the purpose of the foregoing account of the psychology involved in the use of verbal expression and the statement of aims in the teaching of composition to furnish a natural basis for determining methods of procedure. From the point of view of this book, these provide the only safe and permanent source of help. The reader is already aware that this is not a book of teaching devices; and the statement just made relative to our bases of study further implies that the reader is not to expect a description of schemes and devices in the discussions that follow. To a certain type of teacher this is disappointing.

If it is not the function of the teacher to manipulate the many ingenious and seemingly practical expedients for securing and handling oral and written compositions, what, then, is his function? Primarily and principally to arouse and direct the thoughts and feelings of his pupils, and by this means to control their ways of expressing themselves. This implies that

[1] *Op. cit.*

from the first the mere technique of English expression must be subordinated to the spirit of the work. Composition is an art, and, as such, it should be approached in the spirit of play, play, however, that leads to much earnest effort. There should go into the work all the vigor that naturally characterizes play, and there should grow out of it all the joy and satisfaction that naturally accompany play. Perhaps there is no high-school subject in which the spirit of the classroom is more important.

It must be apparent that there are peculiar difficulties and limitations involved in securing and maintaining the spirit and the frame of mind suited to this work.

1. As in the pursuit of any art, there must be much and almost constant practice, in this case, practice in selecting and organizing ideas; then finding, in connected discourse, fitting expression for these organized ideas. The nature of the human mind is such that all practice tends to become mechanical. The very ease with which we come to do things sets up a barrier to further progress. This then is one of the pedagogical difficulties to be overcome in all drill.

2. It is an important principle in the teaching of composition that the work be so managed as to capitalize the abundant flow of mental, emotional, and social energy characteristic of adolescence; nothing must be allowed to check the natural enthusiasm of youth if the results are to be commensurate with the ability and energy of the pupils. But as a matter of fact, high-school pupils are not in the habit of using speech as a fine intellectual instrument. In their social and everyday use of English, they are generally lacking in all effort at nice distinctions and careful organization. The high-school pupil's range is usually narrow, and what he says is often restricted by the meagerness of his vocabulary. However, no great skill on the part

of the teacher is required to stimulate a natural, spontaneous flow of language of the kind just referred to. Dewey puts the pertinent question: "How without checking the spontaneous natural motives—motives to which language owes its vitality, force, vividness, and variety—are we to modify speech habits so as to render them accurate and flexible *intellectual* instruments?" [1] This question points definitely to a real difficulty demanding much tact and skill: namely, the difficulty of transforming the language habits that have been concerned with the ordinary affairs of boys and girls into habits suitable to the growing intellectual task of conveying knowledge and assisting thought that is concerned with precise ideas. To speak glibly and write readily is not enough.

3. All teachers of English soon discover that they are not dealing with the language habits of the individual pupils, but that they are meeting and combating the loose thinking and speaking habits of the homes and the community in general, or, most difficult of all, the modes of thought and speech prevalent in the social groups into which their pupils have fallen. In dealing with the language habits of the social group, the teacher has to contend, not only with fixed habits of thought and expression, as in the preceding difficulty, but with the practices and standards of a group, the members of which have implicit confidence in the wisdom and judgment of the group. During preadolescence the gang knows; in adolescence the "bunch" understands. In other words, the adolescent's language habits are socially entrenched, and skill and insight are needed in breaking through the defenses. These limitations and difficulties will be considered in their appropriate places.

In recent educational literature and discussions,

[1] *Op. cit.*

"motivation" has been a word to conjure with. The psychology of all human situations demands an incentive. Educational effort at every level is vitally affected by anything that furnishes a remote or an immediate motive for effort. But as follows from our account of youthful characteristics, there is no period in life when worthy motives act with as much vigor and certainty as in adolescence; and because of the limitations and difficulties already indicated, there is no line of high-school effort in which natural and compelling motivation is more necessary than in teaching English composition.

Effective motivation in composition includes at least two important principles: (1) the creation of a sufficient moving force *within*, and (2) the supplying of helpful conditions *without*. The first is the psychological; the second is the social aspect of motivation. Neither can be neglected without ignoring the nature of high-school pupils.

The psychological aspect makes high demands on the teacher's insight, resourcefulness, and skill. In some way, he must bring it about that his pupils seize upon significant thought material, do discriminating thinking about it, organize it, and become so enthusiastic over the results of their efforts that they feel they must share these results with others. The pupils must be induced to carry their efforts to the point of feeling that they are ready and anxious to make original and in some way unique and worth-while contributions. This involves the whole pedagogy of stimulating thoughtful effort, suggesting suitable methods of attack, and checking results without curbing interest and enthusiasm. It is not always easy to arouse high-school pupils to do selective thinking; they are not generally experienced in the refining processes of thinking that lead to precision and accuracy. In some

way, and this is generally by means of skillfully directed discussion, they must be led to compare, contrast, and select their words and phrases with a view to saying effectively just what they wish to say, a thing they have not often been in the habit of doing. The discussions must lead to practice in definite thinking under stimulating circumstances. The teacher who understands adolescents will place the emphasis on the thought material rather than on the form. To them ideas are stimulating, and mere language discriminations are often thwarting in their effects. Practically all efforts at composition involve the imagination in some form. It is through the youth's imagination that we most surely and fruitfully stir his intellect and fittingly arouse his emotions; hence effective motivation includes an appeal to the imagination. All this pertains to the motive force within the pupil.

The social aspect of motivation is also suggested by the nature of adolescents. The instinct of communication is dominant, and this serves as a strong incentive to effort provided the pupils are furnished with an audience. Professor F. T. Baker's statement is apropos: "The only test of language is the effectiveness with which it does its work of conveying ideas to some one else who wants to hear them or who is made willing to hear them by the way they are put." Indeed, who cares much what he says or how he says it if there is no one, real or imaginary, to receive and appreciate his message? There must be some one to interest, else why should one make the effort to be interesting? There must be some one to understand, else why try to be clear? There must be some one to applaud, else why should one do his best? Thus an important factor in motivation is a real audience situation that will serve as a strong social and intellectual stimulus, and it is the teacher's function to create such a situation.

For almost all high-school pupils, the most stimulating audience is furnished by the members of his own class or school. Because adolescents are instinctively gregarious and are anxious for approval, they are solicitous concerning the approbation of their own social group. Matters may be so managed that the class will supply an encouraging audience, and the school paper will furnish a wider audience for the most worthy efforts. Also, as Parker suggests, "if the teacher takes the right attitude, he may often succeed in stimulating the students to be interested in presenting their written material to him as constituting an appreciative audience." [1] Whatever the audience, it must be receptive, sympathetic, and critical in a constructive sense; and this situation the teacher must in some way control.

The principle of motivation will emerge again in connection with the discussion of classroom methods and technique.

At all levels of high-school composition, it is important that the teacher be in sympathy with the spirit of adolescence and that he should guard against treating the pupils as children or as preadolescents. The methods of attack and the emphasis must change with the changing age and point of view. In the earlier stages of the work, there was fittingly a strong emphasis upon uniformity and habituation; whereas, in the high school, as Chubb expresses it, "a new reliance is put upon conscious freedom or self-regulation, and upon developing individual differences and preferences." High-school pupils, although more critical than preadolescents, are "much more accessible and moldable, much more readily and deeply inspired, than their juniors." [2]

This means that the methods of the recitation, both

[1] Parker, S. C., *Methods of Teaching in High Schools*. Ginn.
[2] *Op. cit.*

in the discussion of subjects and materials and in the oral criticism of the pupils' writing, should be as free and informal as is consistent with serious effort. If the discussions and criticisms are well managed, there is no subject in the entire program of studies that gives fuller scope to the pupils' intellectual powers or affords better opportunities for the application of the principles of individual differences. Perhaps the much-used term "socialized recitation" is descriptive of the type of classroom discussion here recommended. At all events, every pupil should feel that, provided he speaks to the point under consideration, his knowledge and judgment are always welcome, with the understanding that his contribution must run the gauntlet of vigorous class criticism. It is in every way a game of give-and-take. With all this freedom there must go a sense of responsibility, both on the part of the individuals and the group, for the successful outcome of the performance. This freedom of discussion does not imply that the pupils are to indulge in sporadic efforts or dash thoughtlessly about, but there is to be an orderly freedom. The attention is always to be centered primarily on the thought with a view to making it worth while and getting it adequately expressed, the form deriving its importance only from the effectiveness with which it conveys the thought. When the matter in hand concerns any thing so subtle and personal as self-expression, and when individual ability varies so much in both kind and quality, the instruction cannot be mechanical or over-rigid without destroying the independence and enthusiasm natural to youth and positively necessary to the spirit of this kind of work.

Turning now more specifically to the matter of method, it would seem that one of the first pedagogical doctrines that should become ingrained in the teacher's mind and practice is that the teaching of verbal ex-

pression, from the very nature of the act, is an inductive process; this is true because we are trying to deal in a practical way with an art that demands personal resources and skill on the part of any one who practices this art. When it becomes necessary to emphasize the science that underlies this art, that is, when the principles involved in effectively conveying ideas are needed in the interest of economy and to formulate and clinch good practice, these principles must rest upon and grow out of a rich array of instances that make it clear and convincing that rhetorical principles are but general statements or summaries of the most effective ways of saying things. By nature the pedagogy of the subject is thoroughly inductive. According to Rollo W. Brown's observation, the advantages of the inductive mode of approach in the teaching of language are continually emphasized in the instructions given to the teachers of the mother tongue in the French secondary schools; and he found them following instructions. For example, "in all the exercises in French, the teacher will devote himself primarily to the actual usage of the language and will guard against subtilties." [1] Is the thought expressed worthy of the one who expresses it, and is it adequately and effectively expressed from the standpoint of the audience? These are the first criteria that should be applied to any pupil's efforts. Afterwards we may ask to what important principles or rules the composition conforms; that is, we proceed from the art to the science. This means that we begin at once to speak and to write that we may from the first train thinking through self-expression.

What does adolescence suggest as to the synthetic method that prevailed in the old books on rhetoric and composition? As already indicated, youth naturally

[1] Brown, Rollo W., *How the French Boy Learns to Write*. Harvard University Press.

sees things in the large; he rejoices in long stretches; his rapidly expanding horizon is exhilarating; he prefers to deal with mass rather than detail. Thus the psychology of the situation clearly points to a method that moves from the whole to the parts. The nature of youth recommends the methods of the artist. "Get in your masses first; settle your details afterwards, and let them determine themselves through the attempt to create a whole, and to convey a total meaning and impression." [1] The natural order evidently is not words, phrases, sentences, paragraphs, and whole compositions, as we find in the old books. This organization is neither logical nor psychological. The purpose and spirit of the whole must settle everything concerning words, sentences, paragraphs, and at the same time the purpose and spirit must control and animate the thought movement. Unless purpose alone controls, we can be sure of no vital unity or coherence.

But difficulties, questions, and objections at once arise: If the young writer does not focus on particulars and on his instruments of expression, is not the thought likely to be amorphous and the thinking incoherent? How will we develop a sentence-sense, generally so discouragingly lacking? Will there not be a neglect of the classes and uses of sentences, as determined by the canons of grammar and rhetoric? What will become of paragraphing, with its splendid possibilities for discrimination of thought? Will anything but drill teach spelling, punctuation, and capitalization? How will the classification, definitions, and uses of figures of speech be introduced? Are there not the important principles of emphasis and climax, with their many possibilities of telling effects, to be learned and practiced? And most urgent of all, is not the enlargement and refinement of the pupils' vocabularies the founda-

[1] Chubb. *Op. cit.*

tion of effective diction and the basis of all adequate expression? These objections to the artist's method of dealing with "masses" first cannot be discussed seriatim; what follows relative to the work of building a vocabulary will illustrate the spirit and the method demanded by the psychology involved.

Various studies that have been made tend to prove that the high-school age is a time when the youth spontaneously tries to make his vocabulary larger and more discriminating. This "strong pubescent instinct," as Hall calls it, begins to be especially manifest from thirteen to sixteen. With enlarging thought areas, a growing desire for self-expression and an instinctive tendency to "show off," it is natural that there should be a strong desire to add to the power of expression. This desire to find increased means of expression shows itself in many ways, one of which is the early adolescent's fondness for slang. This fondness originates, according to Lounsbury, in his effort "to say something more vividly, strongly, and concisely than existing language permits it to be said." The conventional modes of expression do not satisfy, hence his use of slang and other piquant forms. But we must not conclude that the adolescent's appetite for new words and modes of expression is due to his desire for mere words as such, although sometimes it appears that way; he is primarily interested in words as instruments of thought and feeling. Recognizing this principle, the teachers of their mother tongue in France, according to Brown's observations, "guide their pupils to feel the uselessness of words unless they are symbols of something physically or mentally real";[1] and their success seems to prove that their teaching methods are in accord with the nature and needs of their pupils. At any rate, the psychology of adolescence clearly

[1] *Op. cit.*

suggests that we capitalize this "tremendous rise in interest in words as instruments of thought." How shall it be done? Shall it be by means of drill and the use of the dictionary? To the youth much drill is tiresome; and Lowell has said, "There is death in the dictionary."

Experience and psychology both tell us that the *natural* growth of a vocabulary can come only through widening experience with affairs and people and the learning of suitable words as they are needed or by repeatedly meeting words in their context. Inglis emphasizes the necessity of something more than drill for gaining an effective vocabulary. "The greater the number of words really associated with their appropriate percepts, concepts, feelings for measure, and the like, which are available, the greater is the possibility of organizing and expressing thought." He also gives warning "that verbal symbolic imagery tends constantly to outstrip the concrete imagery without ultimate reference to which the verbal symbol must always remain vague, general, and ill-defined." [1] This implies that there is no mechanical drill method, no short cut that will put the pupil in possession of an active vocabulary closely related to the mental states supposed to be represented by the words used; nor will such a method aid the thought processes which underlie all sincere and worthy expression. The only safe way of extending one's vocabulary is extending experience; this comes by means of more actual or vicarious contacts with things and persons or by more experiences with words in their proper setting and thought relations. In the classroom, experience is extended by skillfully directed discussion and attention to thought movements and their verbal representation.

But extension of the pupil's usable vocabulary is

[1] *Op. cit.*

only one phase of a two-phasal objective. There is also great need for an intensive as well as an extensive vocabulary development, and accuracy and precision are linguistic virtues difficult to attain. When pupils enter high school, their use of words is generally characterized by looseness, vagueness, ambiguity, and inaccuracy. According to Professor Dewey, such defects constitute "the aboriginal logical sin—the source from which flow most bad intellectual consequences." If not eradicated, vagueness and inaccuracy in the use of words "tend to persist and to become a barrier to the advance of thinking." [1] Accuracy and precision in thinking and in expression mutually condition each other, hence must be developed together. The growth toward clearness and definiteness in the use of language is of necessity a gradual and often a slow process, because, like all advance in the art of expression, it is conditioned by perceptual and reflective experiences; the first kind of experience comes largely through living in a varied and wholesome environment, and the second type of experience is stimulated and fostered by free, thought-provoking discussion, having for its objective the highest degree of accuracy and precision in accord with the ability and maturity of the pupils. As the pupils advance intellectually, and as there comes a closer and firmer grip on language forms, words are handled with severer scrutiny, and more attention can be given to their connotation as well as their denotation.

If the pupils were concerned with merely increasing the size and accuracy of their vocabularies, they should focus continually upon the fundamental or root idea of the words, which is relatively constant; but words have an extrinsic as well as an intrinsic meaning, and this appears and demands careful consideration when words become part of connected discourse. The high-

[1] *Op. cit.*

school pupil is ready to learn that practically all words are susceptible of varying shades of meaning, which are determined only when the words enter into contextual relations. Like other mental efforts for which they are fitted, high-school pupils find pleasure in distinguishing the uses of words from their context; they readily realize that this sort of discrimination is necessary for both accuracy of thinking and expression. This phase of high-school English can be made effective only by class discussion and considerable practice. Fundamentally, it is training in discriminating consecutive thinking, which eventuates as carefully discriminated consecutive discourse.

The classroom discussion favorable to the development of a larger and more efficient vocabulary is the same in kind as that needed in all phases of English teaching, and it will be considered in connection with classroom technique.

Still more difficult do teachers of composition find it to develop a sentence-sense. This involves the habits of sequential thinking and consecutive discourse; pedagogically this part of the work is even less amenable to mechanical and rigidly planned modes than is vocabulary development, hence better illustrative of the methods here approved.

As with vocabulary enlargement, the time is ripe for a decided advance in sustained thinking and more developed structure. According to Hall, "The sentence is affected by the more voluminous mentation of the teens. It seems always to grow longer and more intricate and sometimes to become for a time inordinately involved." . . . "Often there is oscillation between different types of construction." [1] J. A. Hancock studied the sentence-sense of 1132 boys and girls, and he found "that the years of greatest change were from

[1] *Op. cit.*

thirteen to fourteen, especially for boys, who develop rapidly in this respect." From twelve to fourteen the increase in the use of the compound sentence is rapid for boys, but from twelve to thirteen girls make an even greater gain. "The long sentences at this age are highly involved and complex, as if many mental items were struggling for suggestion but tended to break down old limits." Thus, as with vocabulary development, the psychology of the sentence is encouraging.

V

When Mr. Brown visited the French schools that correspond to our secondary schools, he found that their recitation "assumes the character of an interesting round-table discussion." The written work, as well as the criticism of it, revealed clearly that the subjects had been discussed in much detail before the pupils began to write. Only after the pupils had been made to see their composition material in "a very concrete way were they asked to think about its significance and to put their conclusions into organized form." In preparing them to write, "there seemed to be no fear whatever about destroying the pupil's self-reliance. It seemed to be taken for granted that a boy may develop self-reliance through foresight as well as through unguided struggle." [1] All this is in harmony with the psychology involved, provided these preparatory discussions are so managed as to place much of the burden of thinking upon the pupils. The teacher must keep his own opinions and preferences in the background, and he must cheerfully recognize significant differences of opinion. This is the only way he can encourage intellectual honesty and secure independent thinking. It is the only way he can cultivate spontaneity and

[1] *Op. cit.*

stimulate *creative* activity. Doubtless this is the spirit of the French classroom. In the pedagogical directions to teachers, there is a warning against "fixed formula, cut-and-dried judgments, puerile impressions, or vain dogmatism."

As in the teaching of other high-school subjects, the assignment of work in composition is an important and vitalizing part of the teaching process. In the light of what has been said, it consists of at least four steps: (1) selecting a subject; (2) discussing subject materials; (3) stimulating truth telling, that is, truthful expression; and (4) when possible, putting the task in problematic form by means of pivotal and thought-provoking questions.

Selecting a subject for a group of high-school pupils should be a coöperative undertaking. Sir Philip Sidney's muse said to him, "Fool! look in thy heart, and write." During certain phases of their development, adolescents like very much to turn their attention inward; to them their thoughts and feelings are important and worthy of utterance. This suggests that we include subjects which naturally lend themselves to personal treatment.

The loose grouping of subjects that follows is intended to be only suggestive. (1) *Topics based on the life and activities of the school.* This class of subjects will always be new, since both the life of a modern school and the pupils are constantly changing. If pupils use such subjects for oral and written composition, and if they feel entirely free in expressing themselves, there will issue at least two important by-products: (a) Significant and worth-while suggestions will result for those responsible for the welfare of the school; and (b) the work may be so managed as to aid in molding and fixing pupil sentiment relative to many matters important to the life of the school. (2) *Topics drawn from social*

life. From the standpoint of adolescent interest, this class of subjects is large. Nearly all that was said in Chapter II concerning the social instincts of adolescents seems to justify the use of this class of subjects and suggests methods of approach. (3) *Topics pertaining to the vocations.* Although the adolescent usually fails to reach a permanent decision as to his life's work, he often gives serious thought to the matter; and he tries to judge the various vocations in the light of his likes, dislikes, and natural talents. At this time altruism is pretty sure to color much of his thinking relative to a career. Many high schools have found ways of correlating the work in English with vocational guidance. (4) *Topics that arise in connection with leisure.* Subjects taken from one's leisure experiences, because of pleasant associations, are generally both interesting and enjoyable, and they give scope for the personal element, which is a natural motive at this time. (5) *Topics relating to current history and matters of public interest.* Because of the youth's widening social and intellectual horizon, subjects of this kind make a strong appeal to many; and large quantities of information and material are easily available. Speaking and writing on current events aid greatly in forming the habit of intelligent reading of newspapers and standard magazines. (6) *Topics taken from other school work.* Enlightened use of this class of subjects implies that the teacher of English keeps himself informed as to what is going on in the other classes, and stimulates his pupils to seize upon suitable topics when their study reaches the point of highest interest. Nearly all high-school subjects are now so rich in material that there is no dearth of interesting topics for compositions. The choice of such subjects should react favorably upon the other work of the school; and this kind of coöperation on the part of English teachers tends to secure the

intelligent support of their colleagues. In many high schools the teachers of composition call upon their pupils to read for discussion or hand in for criticism work prepared for other classes—a natural and mutually helpful form of coöperation and a practice that should develop worthy content for the work in English.

In the next phase of the work, Mr. Brown found the French teachers especially skillful and thorough. The discussions of subject matter in the secondary schools of France were always very informal; the interests and capacities of individual pupils were constantly kept in view; and content and organization always received emphasis in this preliminary treatment. The chief aim of the teacher of English in this part of the work is to get the pupils to do accurate and precise thinking. When a child finds that his vocabulary is not adequate to express his half-formed thoughts, he naturally sidesteps the difficulty and expresses such ideas as his meager powers of expression readily phrase. At this point the resourceful and skillful teacher becomes very helpful. No one grows by dodging difficulties, and youthful vigor and enthusiasm make possible a progressive and methodical conquest of the difficulties. By guiding his perplexed pupil and the coöperating group in a process of selective thinking, that is, by leading them to make comparisons and contrasts needed to sharpen and refine their thinking and stimulate their expression, the teacher gradually brings about harmony between his pupil's thoughts and his manner of expressing them. In this phase of the work the teacher has need of much skill in questioning. As Chubb expresses it, he uses "the gentle probe of stimulating suggestion to stir the mind, to start the process of self-exploration, to quicken the memory";[1] and the result of his efforts must, as far as possible, be an

[1] *Op. cit.*

expression of the pupil's own thinking in his own language, both of which have been refined and sharpened by a process of vigorous classroom discussion.

Although educators are now pretty well agreed that the primary and most important function of the composition teacher is to stimulate and guide the thinking and the organization of thought, the older textbooks and much of the present teaching place the chief emphasis upon the way ideas are to be expressed, thus ignoring the fact that for the adolescent content is always more important than form, and disregarding the principle that in all true art the content must determine the form.

The third step mentioned in the process, stimulating truth telling, should be well under way when the subject matter, its organization, and the point of view to be maintained have been adequately discussed. If the teacher keeps his own opinions and preferences in the background and suppresses his own feelings, thus providing for and encouraging freedom of thought and expression on the part of his pupils, he will provide the conditions that tend toward truthfulness of expression. It is a form of intellectual honesty that we are striving for.

The assignment of work in composition can be put in problematic form by closing the preliminary discussion with a few pointed questions. For example, how can you tell the story so as to make clear and interesting certain definite points? What is the most advantageous point of view to maintain in order to produce a certain definite effect in your description? How can you best arrange your explanations in the interest of clearness? What is the most convincing arrangement of the arguments you intend to use in proving your proposition?

If this preliminary discussion of material and its

use has been successful, the interest of the pupils is aroused, their minds and feelings are in motion, and their imaginations are on fire. They are eager to go on with the work. Unless they really wish for a chance to express themselves on the proposed subject to some one, they are not really ready to speak or write.

The pupils should know as definitely as possible to whom they are to express themselves; that is, the proposed audience situation must be in mind from the first, and the pupils must be encouraged to maintain the point of view of the probable audience. This involves a constant use of the imagination and furnishes valuable training in focusing on the interests of others; this is an attitude of mind that should become habitual. This implies that the real test of oral or written expression is the effect it produces upon the audience, and an audience is always assumed. Perhaps we may even say the real test of the teacher is the way he provides and manages the audience situation, even if he is the only auditor. If the class is large, it is not practical to have every piece of writing read to the class, yet this must be the expectation and hope of teacher and pupils; for it is a natural stimulus.

In the French classes in composition, the teacher invariably dwells upon subject matter and organization when criticizing the work of the pupils, again stressing content rather than form. While the efforts of the pupils are being evaluated and criticized, the teacher will constantly hold the class to such questions as the following: Does this express to the intended *audience* the exact *thought* and *feeling* of the speaker or writer in a clear, interesting, and impressive manner? Is there anything about the words or forms of expression used that might distract the attention from the *thought* presented? In other words, the chief aim of criticism is to determine whether the pupils have expressed their

honest thoughts and feelings rather than any particular stylistic effects. Training in the habit of sincere and adequate thinking and expression is an affair of such seriousness, from the standpoint of educational results and character building, that teachers are not justified in busying "themselves with lessons in literary millinery or any artificial kind of decoration." As the work advances, less and less attention should need to be given to the mere mechanics of writing; hence more and more stress upon the quality and organization of the thought and the whole effect produced. Indeed, there comes a time when the teacher is warranted in treating sloppy *form* as a personal offense, notwithstanding the well-grounded principle that teaching must be on an impersonal level.

When and how shall the criticism be made? The largest possible amount of criticism should be oral and given by the members of the class. For reasons already discussed in Chapter II, there are no means of criticism so interesting and effective as the vigorously expressed judgment of the class group. It is the teacher's function to stimulate and control this evaluation by the group, to see that the focus is upon important matters and that the criticism is genuinely constructive in both form and spirit. If the criticism is sincere and ordinary tact is cultivated, there is no danger of hurting any one's feelings. Boys especially come to enjoy free, give-and-take discussion involving vigorous methods of attack and defense, just as they come to glory in the personal contacts of the athletic field and the frank criticism of their competent coach. Criticism may be extremely frank and at the same time sympathetic. Both the spirit and the methods of these coöperative efforts are in the hands of the teacher and should become habitual with the class. There is nothing more stimulating than the open and socially expressed judgment

of one's intellectual peers. All adolescents care very much for the opinion of their social group, and public sentiment is the strongest social force. In this, as in the preparatory discussions, the teacher's opinion must be kept in abeyance much of the time; but when it is needed, it must be positive and definite. There are the best of reasons why the pupils should feel perfectly free to disagree with the teacher as well as with their classmates; they must be shown why. It is a case of reasoning together, not of dogmatizing. The teacher will guard against allowing the class discussion to degenerate into fussiness over insignificant details or allowing criticism of such a nature as will tend to make the pupils too anxious about mere correctness. As Professor George H. Palmer once pointed out, "There is something enervating in conscious care. Necessary as it is in shaping our purposes, if allowed too direct and exclusive control, consciousness breeds hesitation and feebleness. Action is not excellent, at least, until spontaneous." [1]

When criticism is the order of the day, what is the best classroom technique? There will be variety from day to day, but both experience and psychology seem to recommend something like the following procedure: When it is not practical to call upon every member of the class, the method of choosing the pupils who are to present their oral or written themes should be such as to cause every one to expect an opportunity to offer the results of his work for criticism; names may be drawn, the class may select, or the teacher may choose. It will be well for the one who reads or speaks to face the class. In the matter of presentation, only the pupil's best should be permitted. No one should be allowed to bore his classmates, hence no indifferent efforts at presentation. The pupils are usually safe judges in

[1] Palmer, G. H., *Self-Cultivation in English*. Crowell.

this as in other forms of effort. When a pupil finishes reading or speaking, it is well for him to remain in front of the class and take charge of the discussion that follows. This method of managing has been used with much apparent success even in first year work. Although in the interest of spontaneity and enthusiasm there must be great freedom, the procedure should be orderly in its important aspects. The pupils will soon learn that mere faultfinding is not true criticism. They will readily understand that it is more tactful to begin with positive appreciation, then follow with a statement of ways in which the work might be improved. The pupil whose work is under discussion naturally desires the privilege of defending his ideas and his manner of presenting them before accepting the suggestions offered for his benefit. When the pupils' voluntary criticisms are finished, there is often much left for the teacher to do. The skillful teacher will find that the pupils have not really exhausted their ideas either as to the content or the form of the work under consideration; and it is a vital work, demanding his best skill in questioning, to follow up and build upon the evaluation made by the class. As arbiter, the teacher must be able not only to give wise counsel as to content and form, but also to convince his pupils of the better way; if he fails at this point either from lack of knowledge or want of skill, his failure is serious because of its far-reaching results.

In all discussions concerning matters of form and the mechanics of expression, there should be but one criterion; and this, effectiveness from the standpoint of the audience. There is no other test, and adolescents are naturally very impatient if other arbitrary tests are imposed. The accepted forms of spelling, punctuation, capitalization, diction, and paragraphing are to be used, not because they are the accepted forms,

but only because they will, without impeding the thought or distracting the attention, most clearly and impressively carry the message of the writer or speaker. Here again the teacher will often be put upon his mettle and have need of a ready wit. In all high-school classes will be found bright pupils who use and defend slang and other favorite provincialisms. Hall tells us that youth is prone to slang and "ruttiness" in expression; the first because it seems spicy, and the second because of his poverty of language. In dealing with the honest opinions of his pupils, however faulty they may be, it is very important that the teacher be able sympathetically to understand the pupil's point of view; otherwise his criticisms will have the appearance of arbitrary decisions. Referring to rules will not settle matters satisfactorily, for the pupils may rightfully question the rules. As Chubb expresses it, "We must work in a larger way for organic appreciation of comeliness, order, and expressiveness." [1] Because of his strong social proclivities and his love of approbation, the adolescent is naturally eager to express his thoughts and feelings effectively, hence the compelling motive that prompts him to make the effort necessary to find adequate expression.

Nothing has been said concerning drill in the mechanical sense; textbooks devote space to many forms of drill and practice, and teachers often give much time to forming and fixing habits that are necessary to facilitate oral and written expression. This seems to be a kind of pedagogical axiom: "After associations have been correctly started, they must be made automatic by effective economical practice." In their research studies, many schools of education provide for experiments to determine the most effective ways of drilling. In mastering the art of correct speech,

[1] *Op. cit.*

there are many parts of the process that must become a matter of habit; such phases of the art as spelling, punctuation, capitalization, grammatical forms, the mechanical side of brief making, and the application of rules for paragraphing should become largely automatic. Until many aspects of verbal expression become habitual, thinking suffers a handicap. Parker thinks that it would be "a good practice to have two-thirds of the assigned topics treated only in the form of briefs and oral discussions, leaving the remaining third to be worked up beyond the brief stage into complete written papers." [1] Surely the reader who understands adolescence and is in accord with the pedagogical doctrines here advanced will not agree to any such application of the principle of drill. This ignores the most natural and effective motive of all expression: namely, the desire to express one's self in the most perfect manner *to somebody*.

However, to say that self-expression must never be delayed for the purposes of drill would be pressing the theory too far and disregarding experience. How, then, are these seemingly opposing principles to be harmonized? It can be done by allowing nearly all drill and mere practice to grow out of the pupils' felt needs; that is, by making the results of drill appear as conditions necessary to ready and effective expression. While in France, Mr. Brown saw "no spelling whatever of isolated lists of words." The French teacher is warned against an overuse of "didactic instruction in grammar." [2] The French teacher commonly uses inductive methods in establishing the mechanical aspects of the mother tongue; and the results are skill and spontaneity in expression and enthusiasm and joy in the work. This often implies

[1] Parker, S. C., *Methods of Teaching in High Schools*. Ginn.
[2] *Op. cit.*

teaching more than "one thing at a time," but this form of approach does not interfere with emphasizing one thing at a time.

In this chapter, it has been said that the functions of the teacher of English composition are to provoke thinking on worthy subjects, to guide the pupils in the organization of their thoughts, to make them realize that they have something worth while to say and to fire them with a desire to say it, to provide a stimulating audience situation, and to bring about vigorous, coöperative, sympathetic, constructive criticism, always stressing the content rather than the form. If his efforts realize these functions, the teacher is to make a constant appeal to the strong social and communicative instincts of his pupils.

CHAPTER XIII

LITERATURE

People will read, they will choose their own reading material, and they will read for satisfaction and pleasure. It is a principle well understood in education that the most potent formative influences are the activities we most enjoy; hence the inference that literature must occupy an important place in any program of studies. The immediate aim in our secondary schools, according to high authority, is to teach the pupils "to read thoroughly and with appreciation, to form in them a taste for good reading, and to teach them how to find books that are worth while." In brief, it is the purpose of literature in the schools to determine how and what the pupils will read both in and out of school. If this purpose is fittingly realized, the importance of literary studies is not to be questioned. This is the customary way of putting the case, and the above propositions seldom raise objections. This statement, however, does not express the point of view of this chapter. In keeping with the educational theory of this book, the immediate purpose of literature in any high-school curriculum is to meet the *present* adolescent interest and needs of all the pupils with their varied and varying tastes and capacities. As will be shown later, if this can be done, all of the many aims and purposes will be attained. This way of stating the purpose of literature is simple; and because of the nature of the subject matter, it emphasizes the belief that the teaching of literature to high-school pupils is more

concerned with the psychology of adolescence than the teaching of any of the other subjects. The validity of this claim is made apparent by a brief statement of the meaning of literature and a mention of the chief adolescent traits involved in its pursuit.

I

A definition of literature free from all objections cannot be made; the writings that we class as literature pass, by innumerable gradations, into forms of discourse that no one would consider as art; and it is understood that "literature" in the schools includes only poetry and prose that, without question, can be classified as forms of art. In this restricted sense, we exclude all writing intended for special classes of people, such as members of the various trades and professions; we include only the prose and poetry that deal with subjects of common human interest, and as Thomas Arnold expresses it, "appeal to the general human intellect and the common human heart." When analyzed, this means that there must be a personal element behind all true literature, that it has its origin in some emotional experience. Bare facts coldly stated are often of great use, but they do not constitute a work of art. It is because of the emotional basis of all real literature that it makes a universal appeal, but the feelings and emotions expressed must be both typical and true to life; otherwise the appeal will not be universal. Because literature as such is rooted in feeling and willing rather than in the intellect, it appeals more than any other form of expression to our whole being. We think with certain parts of our nervous system; but when we are stirred with emotion, every organ and fiber is affected. As Paulsen expresses it, in feeling, "the innermost essence of being manifests itself"; we *are* what we feel. "As a man thinketh *in his heart* so is he." And

Royce and others have pointed out that all "valuable truths whatever about life, about its ideals, or about its problems" can be evaluated and learned only through the feelings. Now in literature the ideas and ideals which have their source in the emotions are so expressed that they appeal through the imagination to the emotions.

Literature has for its field the whole of life, but especially every phase and aspect of life as disclosed in human beings. It is the function of literature to realize, embody, and interpret life; and the best literature does this in a manner that seems independent of the conditions and times which produced it. For this reason it appeals to the oncoming generations of every land. Because the deep and significant things of life are realized through human emotions and because of the enduring interest in and sympathy for all knowledge of life, "literature," as Arlo Bates has said, "is the inventory of the heritage of humanity."[1] Thus, since it touches all things of life, literature is both broad and deep; but for reasons readily apparent, the literature of the schools must embody and express only sensations, thoughts, and emotions of healthy souls, for only these are typical and wholesome. As in the teaching of science, we must, in the interest of economy, as well as in the interest of sanity and correct perspective, deal only with the typical. In other words, we teach only the literature that embodies and expresses ideals and emotions that make life worth living. Not only is the content of literature rich and broad and significant; but because of the vehicle used, it is more universally understood and appreciated than any of the other arts.

How do the nature and scope of literature as stated meet the interests and wants of boys and girls of high-

[1] Bates, Arlo, *Talks on the Study of Literature*. Houghton Mifflin.

school age? The following summary of adolescent characteristics should furnish the answer.

Instincts with their corresponding emotions are hereditary modes of response. The whole physical mechanism, but especially the visceral and glandular systems, are fundamentally involved in all emotional responses; and the feelings and emotions are inextricable accompaniments of all mental states. In Chapter II, it was stated that during adolescence great and significant changes occur in glandular structures and functions. From this we should expect marked emotional developments during this period, and such is the case. There is a rapid increase in the strength of emotional responses, and it is common knowledge that adolescence is a time frequently of great emotional disturbance; so much so that we are in the habit of using such strong words as "storm and stress," "turmoil," and their like to describe the period. If literature grows out of feeling-states and speaks the language of the emotions, the pedagogical implication is clear: the instincts, hence the needs, of high-school pupils point to literature as a vital adolescent subject. Literature naturally stimulates emotional growth; and by furnishing adequate expression of genuine feelings, tends to relieve emotional strain and aid in consolidating and integrating into healthful relations the instincts, feelings, habits, and thinking—all greatly needed at this time in order to harmonize and stabilize the "longings wild and vain."

Life and life in abundance is a characteristic of adolescence. Bourne says: "There is a great, rich rush and flood of energy. It is as if the store of life had been accumulating through the slow placid years of childhood; and suddenly the dam had broken and the waters rushed out, furious and uncontrolled, before

settling down into the quiet channels of middle life." [1] This high tide of life adds to the confusion of youth and tends to swamp him in the untried waters. But because of the source of literature, the youth finds in it a fitting and sane counterpart of his own impelling stream of life. Much of the best literature has for its subject the life, characteristics, and interests of youth (in fiction adolescent characters generally dominate); and the treatment harmonizes with youthful thought, temperament, and feeling. The narrative moves rapidly and vigorously, the descriptions are gorgeously colorful and compelling, and the thinking is cogent and persuasive. All this fits the nature and needs of adolescents; and fortunately in the best literature, although life is portrayed as an adventure with its thrills, there is a saneness, a perspective, and a balance that must have a steadying as well as a stimulating influence on the adolescent readers. In literature, the high-school pupils vicariously extend their experiences; and there is a sweet reasonableness in the best of it that serves as a balm, while it encourages, instructs, and inspires. Because it portrays abounding life in all its phases, literature makes a natural and strong appeal.

Adolescent curiosity and youthful enthusiasm are the natural concomitants of this rich rush and flood of energy. The ductless glands are returning to the blood stream their new and magic-working potions; the fiber systems of the brain are rapidly extending. Because of the consequent emotional developments, familiar things and relations seem *new*, and the physical and social worlds become a "rich booming cosmos," and this new curiosity keeps the adolescent on the *qui vive*. All this is most fortunate and significant, for it continually stimulates the youth to make mental excursions far beyond his former range. Let us not smile

[1] Bourne, Randolph S., *Youth and Life*. Houghton Mifflin.

even when he "sinks the string of thought into the Fathomless." His most urgent curiosity concerns human beings and human relations and his accompanying enthusiasm naturally makes him a constant seeker after knowledge of human affairs and the possibilities of life. In literature, the youth may find embodied and universally recognized the eternal facts and principles of human relations. In books he may extend and supplement his knowledge by sympathetically living the life that he finds delineated in a way that moves while it instructs. The facts concerning social existence are acquired but slowly through actual experience; and because of the subjective elements involved and because of the nearness of it all, the perspectives and values are in danger of being distorted. The best literature and art present imaginatively and interpret helpfully the facts and relations in a way true to life. They give the knowledge that boys and girls of high-school age naturally crave.

Adolescent sympathy, altruism, and idealism are delightful and furnish the bases for nearly all that is best and beautiful in human character. Individual development and race progress depend on these instinctive responses. The rebirth of imagination and the deeper and stronger emotional states aid in the functioning and growth of these soul qualities. The development of these human attributes in our pupils is worthy our best efforts. In literature, especially poetry, the teacher finds a safe and an effective ally. The best art has been altruistic and idealistic; and fortunately for our purpose, ideals and altruistic principles are set forth imaginatively and sympathetically in literature. Here our pupils find encouragement and help in their efforts to conceive truer and more attainable social and moral conditions and standards.

During childhood and preadolescence, the attention

is focused on externals; the boy copies the activities of men, the girl imitates domestic procedures. With the dawn of adolescence, the interest shifts to deeper things. The youth becomes sensitive to every passing manifestation of personality and every sign from which character may be recognized and understood. He comes to have a feeling, which of course he cannot express, that personality is the ultimate basis of all social relations and the one thing of never-failing interest. This interest and admiration naturally and readily pass into hero worship, another trait of early adolescence. The youth unconsciously merges his thoughts and feelings with those of the one whom he admires; in this way he draws sustenance and inspiration from his hero. As Randolph S. Bourne expresses it, youth receives "from the treasury of a great and good personality" the first confirmation of his own better self. The pages of literature abound in full-length portraits of personalities that are strong and fascinating to the eager eyes of youth. The high-school pupil naturally follows the movements of the great characters in literature with bated breath; he identifies himself with their thoughts and feelings; his pulse quickens as the plot thickens; when the fight is on, his muscles are tense and his nostrils distended; he shares imaginatively all the fortunes of his favorite heroes. He finds portrayed every phase of human nature and every mood of which the soul is capable. In all this there is a close and sympathetic relation between adolescent interest and literary content.

As already noted, the adolescent's receptive powers outrun his powers of expression; literature expresses for him beautifully and feelingly what he is naturally ready to receive. The youth is eager to learn spiritual meanings and social values, his nature urges him on this quest, and in the best literature these meanings

and values are carefully balanced and adjusted and skillfully embodied in social and moral situations. Because the appeal is to the imagination and the setting is emotional, the youth is instructed and at the same time impressed respecting these meanings and values. At this time outdoor nature is taking on new colors and meanings; for the youth she "speaks a various language"; and the Bryants and Wordsworths are ready to guide his steps in paths of beauty and to interpret for him the objects of his natural environment. Thoughts directly or indirectly relating to sex and matters pertaining to the affections occupy the youthful mind much of the time and agitate him as nothing else does; nine-tenths of all literature deals with this subject, and the best is clarifying and salutary in its influence.

The serious-minded youth greatly desires to set his thoughts and feelings in order. His new-found powers and emotions reveal a new world, but a world badly befogged and bound by old traditions and fixed conventions. For him there is often "chaos of thought and passion, all confused," and he feels the need of help. The many masters of prose and verse have realized and embodied in concrete form all his thoughts and feelings; they will teach him that he is not alone in his troubles of the spirit; and their words of distilled wisdom should help to clarify his thinking and aid him in understanding his emotional experiences.

This parallelism between the nature of the adolescent and the content and form of literature seems to prove that literature is perfectly suited to the nature and needs of high-school pupils; and the above statement, it is hoped, will be suggestive both as to curriculum content and manner of presentation, since it implies the pedagogical principles underlying the teaching of literature to pupils of high-school age.

II

As already stated, it is assumed that the immediate function of literature in our high-school curricula is to furnish our pupils with the mental and emotional guidance and nutriment which their youthful nature demands; the harmony just pointed out appears to warrant this assumption. But the accomplishment of this immediate purpose does not in any way operate against realizing all the aims and purposes that are commonly urged; on the contrary, if we minister to the real needs of our pupils, we shall be sure to include the other values of literature, hereafter discussed.

In a whole-hearted study of the world's best literature, such a study as would be natural in pursuing any subject that fully meets their cravings, pupils cannot fail to acquire a liking for it and a judgment concerning relative merits. As indicated in another connection, they profit by the spiritual experiences of the past. For high-school pupils, literature has great integrating values, since it brings them into sympathetic contact with the traditions, the customs, the thoughts, the feelings, the aspirations, and many of the actual experiences of society as a whole, that is, "the spiritual inheritance of the race." Our pupils may learn the possibilities of life and at the same time how, in concrete situations, these possibilities may become realities. They learn that, in some human relations, as Edmund Burke once said, "our passions instruct our reason," that our feelings are safer guides than our thoughts. Out of an eager and appreciative reading of the best, our pupils should gain the following abilities and cultures: the ability to read thoroughly and whole-heartedly, an opening of the eyes to beauty in all its forms, a culture of the imagination and a knowledge of its relation to the powers of the mind, a sense of moral

values, and trained feelings and emotions which Arlo Bates designates as "the culmination of wisdom."

Thus the great ultimate function of literature is so broad in its scope that it may be understood to embrace and transcend all the others; it should dominate all the discussions and suggestions that follow—it is *to teach life*—life as it is lived, using James's phrasing, in that "zone of uncertainty of human affairs in which all the dramatic interest lies." The things that most vitally concern us, the things that affect our social and moral welfare, hence our happiness, are not settled by either logic or the principles of science; deductions are feeble instruments when applied to the problems of life. The most practical truths do not come through logical processes; they must be distilled out of continuous experience in the realm of human intercourse and endeavor. It cannot be otherwise, since our life in the sense we are considering is a complex plurality of thousands and thousands of interpenetrating elements and tendencies; these elements and tendencies so encroach and play upon one another and upon the same varying factors in other lives that no one is able to use confidently any of the nicely formulated principles and rules of thinking when deciding important moves in life's game. But there are natural limitations to learning the art of living through direct experience in the fields of human intercourse and endeavor. "Art is long, and time is fleeting." Youth is prone to magnify the features of life that immediately affect him, and these he can see only through the many-colored medium of his own vibrant and troubled emotions. The whole of life, life as the great adventure, is much larger and deeper than any special line of investigation or any individual experience can reveal. From this it follows that the youth needs every available means of help. Fortunately, as Arlo

Bates asserts, "the desire to fathom the meaning of life is the most constant and universal of human longings." [1] In the adolescent, it is sometimes more than a longing; it becomes a passion. He feels all needs by turns; he throws himself without reserve into his efforts to see, interpret, and respond to the drama of life which surrounds him; and he is eager to seize upon any help that seems to promise a reasonable hope. This help we lead him to find in literature where is recorded all that is thus far known about life and its possibilities. This is the ultimate function of the study of literature in our high schools, and it will be most surely realized if the immediate aim of fully ministering to the pupils' present interests and needs is accomplished.

There is another important function of literature which is both immediate and ultimate, and the degree to which this function is attained is the only safe measure of our success in the pursuit of all the other functions. The most obvious purpose of all forms of art is to give pleasure. Strange to say, this is the function of literature that has been most persistently ignored in our dealing with it as a high-school subject. For this singular and seemingly perverse blunder, there are many excuses but no sufficient reasons. During the past generation the official excuse has been our college entrance requirements and their assignments of books for reading and books for intensive study; and this authoritative prescription, for legitimate commercial reasons, has been given support by all the textbook companies in their publication of "English Classics" edited by university professors, to whom the adolescent mind appears to be unknown. Another explanation for robbing our pupils of their natural enjoyment in reading the interesting books to be had on every hand is the worthy old school virtue, thorough-

[1] *Op. cit.*

ness, of which the conscientious teachers of literature have made a fetish—of this more later. Why should youth not enter the fields of literature in the same way that he pursues life, that is, in the spirit of adventure? The subject matter, which is thrilling narrative, colorful description, and vivid and compelling character portrayal, furnishes vicarious enjoyment of all that is human; in the best literature the form is clear, the language effective, the appeal natural, and the verse moves with pleasing rhythm in harmony with the thoughts and feelings expressed. There is something appropriate for every changing interest and mood; not so with actual life, for we are not always allowed to choose. Nearly all high-school pupils need help in finding and seizing the joys of literature; it is the teacher's part to follow the changing interests and moods, for it is his part to teach in harmony with the needs of his pupils. Thus pleasure is an immediate aim that will be realized if adolescent interests are known and regarded; it is an ultimate purpose of literature, as of all the other arts; and it is a safe test of the efficiency of the teacher's work.

These are the functions of literature which should aid the teacher in determining what to teach and how to teach. These high purposes should be an inspiration as well as a guide. If these purposes are attained, the teacher knows that he is helping to determine not what his pupils will *do*, but what they will *be;* it is usually during the period of youth that spiritual values, personality, and character are settled. In a way, the teacher is a shaper of destiny, the destiny of individuals, and through individuals he may influence the fortunes of the race.

III

In the psychology and the pedagogy of literature, appreciation is a word of much importance. Unless

our pupils are led to appreciate, in the etymological sense of the word, the meaning and the beauty of the best things in the literature that we try to teach them, none of the functions just discussed will be realized. What is appreciation? How are people trained to appreciate?

Appreciation is a process of fixing values. As used in relation to life and art, it means setting just values; it is determining the worth of a thing or situation. Subjectively considered, it is a process of forming attitudes. It involves delicate perception and wise judgment. In its most common use, appreciation is applied to the good, the beautiful, and the true. It involves more than a cold-blooded, intellectual appraisal; besides a recognition of intrinsic worth, there are emotional elements, usually satisfaction, enjoyment, gratification, and the like. Yet true appreciation is not pure emotion, which means little more than complete and *passive* surrender to one's feelings; appreciation is a sentiment that arises in connection with perception and judgment.

With the preadolescent, appreciation in general is limited to strictly personal uses, the attitude is egoistic, and the judgment is quick and practical. In adolescence, there is a growing sense of values—personal, economic, social, esthetic, and moral, because of widening interests and a richer and stronger emotional life. This clearly implies that the high-school age is the time for training in appreciation, and the teacher of literature cannot well neglect any of the elements that constitute a complete act of appreciation.

1. Judd and other psychologists have emphasized the point that appreciation is an active process rather than a passive emotional state of mind. It is "a general response to a total situation," hence a form of action. In the case of literature, the reaction is

to both form and content as they unite and produce a unified impression. There is implied genuine effort on the part of our pupils; and there are implied individual interpretations, always varying according to individual abilities.

2. The appraisal must include the intellectual; without understanding there can be no worthy appreciation. A sentimental response, such as appreciation involves, is more than emotion; it is less intense and more deliberate. We may debate as to whether the understanding that results from study adds to one's enjoyment of a piece of literature; but there can be no doubt that a full understanding brings a new kind of enjoyment, the kind that is more satisfying to intelligent people. Of all the arts, literature is most in need of the intellectual elements of appreciation, since it is seldom purely sensuous, seldom free from the dominance of ideas; and the most worthy emotions cluster around some form of judgment.

3. An act of appreciation which results in pleasure (or displeasure) must, from its nature, have an emotional element; and the emotions are forms of behavior. As we have seen, the foundation of the emotions is very complex: the ductless glands, the smooth muscles, the nervous system, and the instincts. This complexity accounts for the highly subjective character of our tastes and our modes of appreciation.

4. In appreciating the fine arts, there are involved esthetic elements based on emotional responses to the beautiful. Unless the teacher of literature possesses some rational idea of the esthetic emotions, as Thorndike affirms, we may expect knowledge to abdicate and opinion to reign in the classroom. Thorndike points out three sources of enjoyment in literature: technique, sensory elements, and suggestiveness. (*a*) Our pupils soon learn to admire and enjoy the mere

skill and adroitness of the author. This is manifest in ways too numerous to consider here: nice discriminations in the use of words, fine phrasing, close sentence structure, clearly apparent sequence of ideas, orderly arrangement of thoughts, unity of effect, unexpected turns in plot, and skillful movements toward natural climaxes. We all enjoy good workmanship, but we must first recognize it. (*b*) The sensory elements of literature, like the song of a bird, may give us pleasure without our knowing the source of the pleasure. These include such matters as meter, melody, cadence, rhythm, rhyme, alliteration, and the qualities described as sonorous, musical, liquid and limpid—mere beauties of sound and regularly recurring stress of voice. Pupils need help to appreciate the sensuous charms of literature, and the teacher who can do justice to these voice qualities of language cannot fail in this phase of his work. (*c*) Suggestiveness is one of the highest literary qualities. It is that quality of literature that awakens moods in the reader—sadness, joy, trust, exultation, pity. It is that intangible attribute which makes words say more than they literally express; what they connote is more important than what they denote. Some poets are wont to combine these two last qualities; there is little besides suggestiveness and melody used for a definite purpose in some of Poe's poetry. If our pupils fail to catch the suggestiveness of many of our imaginative writers, appreciation is impossible; skill in teaching is needed, since to explain is to destroy the effect. Adequate reading and a few delicate hints will do the work.

Because of the variety and complexity of appreciative reactions, the work of training appreciation is difficult and delicate. From the nature of the thing attempted, specific procedure is practically impossible. The maturity and experience of the pupils are determining

factors, and method must depend upon how the members of the class respond. Fortunately youth sees freshly and without prejudice, and his vision is often true. The following pedagogical considerations grow out of what has been said regarding the nature of appreciation; it is not a process that warrants definite directions.

The aim of instruction and training in appreciation is to obtain repeatedly a correct response, rationally and feelingly correct. The training can come only from dealing frequently with concrete material or actual situations; it is a process neither formal nor abstract. The aim is never information, but always values and values arising out of private enlightened judgment and the personal feelings of the one under training. The teacher is always in danger of intruding his opinion and feeling; the response on the part of the pupils must be a sincere reaction to worthy form and content. However, in the study of literature, we aim to penetrate to the author's meaning and to see and to feel as he did when in the act of creating; that is, literature, like any other form of art, should engender the same psychic state that produced it. This aim precludes the obtrusion of personal whims. The realization of this aim implies that high appreciation is almost a creative process; our pupils are to evoke before their mind's eye the inner vision of the author, and, if possible, have the same emotional experience. Thus true appreciation is a sympathetic, creative achievement.

Since appreciation is essentially a spontaneous and creative procedure, we may well ask, "Can it be taught?" Like morals, it cannot be taught directly; but the teacher with skill and insight stimulates the pupils to a form of self-activity the outcome of which is a richer understanding and a more appropriate

feeling. The method is indirect, and the teaching process involves the psychology of suggestion.

The most primary requirement of the teacher of literature is that he judge well and feel strongly. The proper mental and emotional attitude cannot come by imitation; it is not something to be assumed like his school clothes. The teacher cannot lead his pupils in paths he has not traveled. Edward Yeoman warns: "You of the cold eye and the colorless habit of life—shall you attempt this mission?" Perhaps we may say it is the teacher's overflow of emotional warmth and enthusiasm that quickens appropriate thoughts and feelings in his pupils.

Favorable conditions for training in appreciation include that indefinite thing we call classroom atmosphere. The surroundings always play on the feelings and influence the thought, but in this case they are very important, especially all that we class as social environment. The class exercise that aims at literary appreciation moves somewhat deliberately, the imagination has time to *play* over the ideas and characters, the pupils pause with harmonious and majestic words, they listen to the voices of joy and sorrow. Inasmuch as they cannot suddenly become jubilant or pensive, an attitude imaginatively and meditatively aggressive is conducive to the proper classroom atmosphere.

Like other classroom efforts, the work of appreciation needs motivation (excuse the much abused word); but this had best come through incidental and indirect teaching. It cannot be done by exclaiming over the "beauty that must die" or the "Joy, whose hand is on the lip," nor can we urge our pupils to think, imagine, and feel. This they are anxious to do. There must be allusions and suggestions that will arouse curiosity, stir imagination, and kindle sympathy.

Anything that the teacher does to add reality to the scenes and people aids appreciation. Aiming at vividness and reality must not lead to encumbering and confusing the pupils with details; photographic completeness is conducive to neither ideas nor emotions. Sometimes the teacher's part will be a suggestive word-picture, sometimes an appeal to the pupils' own observation and experience, sometimes a skillful and meaningful reading of the passage, and sometimes it will be questions as to what is seen, heard, or felt.

But, if needful, the pupils must be helped to understand the language and the thought. "What does the author say, and how does he say it?" are vital questions. There can be no appreciation with these unanswered. If the medium of expression is not familiar, or if the ideas, imagery, and emotions are outside the pupils' fields of experience, something must be done to remove these initial difficulties; and in removing these troubles as to form and content, the pupils are often, sad to say, led into "the thorny thicket of scholastic bramble," whence they emerge without experience, light, heat, or beauty. Analysis is as fatal to the life of a poem or a beautiful piece of prose as is dissection to the individual well-being of a biological specimen. Explanations and helping information are needed on the spot; but long-drawn-out statements and discussions are never necessary to the clearing up of essentials. Appreciation is an affair of discriminating reaction; let the teacher show discrimination in the amount and the kind of information he introduces as an aid to interpretation. Let him remember that the whole is of more importance than any of its parts, and that "the letter killeth, but the spirit maketh alive."

As in nearly all teaching on the high-school level, only concrete illustrations, comparisons, and contrasts aid the imagination or arouse the emotions; youthful

enthusiasm does not have its origin in abstractions; the situation, the characters and their experiences, and the principles of life involved can be best impressed by suggesting personal and well-known incidents, familiar sounds and sights, images already clear, and feelings based on the fundamental instincts.

No argument is needed to establish the importance of training appreciation through the masterpieces of literature. Literature embodies and interprets life; and since it simplifies experience, it is well adapted to inculcating life's values. When the youth finds and prizes at their true worth the values and ideals here bodied forth and given a local habitation and a name, he is likely to feel the full force of the social and spiritual elements. All human effort is a quest for values, and the youth must lay hold of the instrumentalities that will aid him in the quest and teach him to know the royal stamp when he finds it. On his success depend both wisdom and happiness.

IV

It is dangerous to be definite and specify the literature that high-school pupils should read. As in every phase of his work, the teacher's sympathetic understanding of youthful interests, and especially his knowledge of the individual needs of his pupils as determined by their maturity and interests, should never be entirely set aside to make way for lists of "good books" and prescriptions handed down from those in high places.

In our efforts to choose those things that will appeal to our pupils, we may safely assume that nothing truly human is indifferent to expanding adolescent interests. This suggests that the range of reading should be wide, and should include all types of literature. Since individual experience is necessarily narrow, one of the

purposes of literature in our high-school curricula is to broaden this experience, hence the need of many forms and kinds.

It is perhaps most important of all that the books read and the methods used shall keep pace with the intellectual and social development of the pupils as they move up the grades of the high school. For apparent reasons, the work will begin with something that cannot fail to interest the pupils. Narrative is best, for a story well told has a universal appeal. Perhaps it will be a carefully chosen short story in which the movement is rapid and the plot element dominates. From the standpoint of interest this is safe. A short story with clearly drawn characters may come next. Then, unless there are reasons to the contrary, a story in which atmosphere is the controlling element will introduce a literary feature perhaps new to many of the class. Poetry should come soon: *The Lady of the Lake*, *Ancient Mariner*, some of Byron's short poems, certain parts of the *Odyssey*, *The Merchant of Venice*. A return to prose may safely be made with Stevenson's best stories, some of Irving and Hawthorne (only a few of the latter's "tales" will do). If one of Scott's novels is read, skill will be needed to get the pupils over the opening chapters, which are discouraging to readers experienced only in current fiction. When the change is made to description, there must be care in choosing and presenting in order to avoid a falling off in interest. The things described must appeal to the visual imagination; there must be movement and color. Argumentative literature should not be taught much before the third or fourth year; this type of literature is a clear demand of middle adolescence. In the interest of appreciation, Milton, if taught, should come late. The principle of progressive difficulty and variety must control the order of choice.

What has just been said is only suggestive and perhaps too indefinite to be helpful; but from the nature of the case, it cannot be otherwise. At the risk of being dogmatic in a matter where dogma should yield to individual psychology, most teachers with experience and vivid recollections of their own youthful interests will insist that there are some stirring things that must not be omitted from any course in high-school literature. They are such imaginatively appealing pieces as Scott's poems that tell of "Knighthood's dauntless deed, and Beauty's matchless eye"—poems that have cheated many a schoolboy of his hour of play; Stevenson's stories of adventure that have thrilled both young and old; a few favorite tales and sketches of Poe and Irving that are so delicate and youthfully human; the plays of Shakespeare that touch life at all ages; some of the *Idylls of the King* that embody so many middle-adolescent ideals and feelings. Every reader, prompted by his own feeling in the matter, will add many more to this list. Literature already studied in the elementary school should not be repeated, for the field is too wide to justify repetition.

There will be need of considerable experimentation with the class. If the choosing leads to lively and continued interest, the teacher may be certain that his work is a success. If the literature read does not hold the interest, the teacher may be just as certain that he is doing more harm than good; then, indeed, the situation is disheartening to all concerned, for the injury done is of such a nature that it is not likely to be overcome. The difference between a person with a taste for worthy literature and one who somehow has come to dislike it is so great and so significant that no teacher would wish to be responsible for the plight of him who finds no comfort, companionship, or delight

in the world's literary masterpieces. Our high-school boys and girls must not think of the choice prose and beautiful poetry which we ask them to read as "stuff." It is an ominous word when so used, a word that the present author has heard too often, especially from boys, for the adolescent boy is in the habit of being brutally frank. Whether the disgust arises from mistaken choice of material or from faulty methods of presentation, it would be better for the suffering pupils to study no literature in school.

V

What literature we teach is important, but how we teach it is more important. There is no subject in which the teacher's resourcefulness and insight count for more. The appeal must be to the *whole* nature of the pupil; and the things to be taught involve every phase and aspect of human nature, including the way human beings react to animate and inanimate nature. There is no subject in which classroom atmosphere has more influence. This is because the emotional setting must be in harmony with the spirit of the literature under consideration. All this implies sensitiveness on the part of the teacher to a constantly changing situation.

Nowhere has the principle that the method used must accord with the interests of the pupils been so shamefully ignored as in the teaching of literature to high-school pupils. "At no time in life is content so important and the form relatively so negligible. Youth requires large issues and values, great wholes of knowledge with never too great prominence of small details, in time and consonance with its newly born idealism. Microscopical and analytical methods are useful later on at the time of examination and criticism; they should certainly for all the earlier years of adolescence be held

in abeyance." [1] J. W. Slaughter here states facts that are well known to every interested observer of youth; yet these are the very psychological considerations that so many conscientious teachers of literature persist in utterly disregarding. They ignore these considerations in the interest of thoroughness and scholarship. Besides his interest in the large view of things, the adolescent demands movement; and the emotional side of his nature counts for more than at any other period of life. These facts, too, the encyclopedic, analyzing teacher often ignores for the same reasons.

The ideal of thoroughness and the ambition to accumulate stores of information are doubtless carried over from the teaching of other subjects. Literature should receive much thoughtful effort from the pupils, but it is a form of school training to which "study" in its usual meaning is not suited. As already indicated, the purpose is not to accumulate information, but to assimilate, to gain experience, to appreciate. To realize these purposes, the pupils must become mentally and emotionally active. In the proper assimilation of literature, the efforts of the pupils are more creative than in their work in some of the other subjects; hence the methods of the classroom must be such as to suggest appropriate thinking, arouse suitable imagery, and kindle fitting emotions without interfering with self-activity and independent effort. This the teacher will do by skillfully timed questions, references to common experiences, well-known incidents, and similar situations in other pieces of literature. He will constantly apply the laws of association and bring to bear on the present problem suitable sentiments from other sources; and he will adroitly lead his pupils to discover the many subtle allusions by means of hints and thought-provoking questions. The teacher always uses his

[1] Slaughter, J. W., *The Adolescent.* George Allen and Unwin, London.

utmost skill in getting even his most capable pupils to discover and appreciate the intangible elements of literature; they must *find* the hidden meaning and beauty and thus know the joy of discovery. Often the safest way to arouse the proper response to intangible beauty is to give a sympathetic oral reading. The keynote is usually a single word or phrase, and a suitable oral rendering focuses the attention and suggests the appropriate thought and sentiment. The intangible often centers in such words as Lincoln's "*highly* resolve," "death's *dateless* night," Æschylus's "the *moody-muttered* grudge," and Ecclesiastes' "man goeth to his *long* home."

By careful preparation, the teacher catches the author's changing moods, as well as thoughts, and, by his manner, tone, and tempo, suggests these moods to his receptive pupils; the adolescent is a being of moods and readily responds; full appreciation cannot come without "that quickening of the heart" when it beats responsive to feelings which inspired all true literature. Without a sympathetic response to the emotional elements of poetry and the best prose the teacher does not meet the chief test of success, that is, active pleasure on the part of his pupils; enjoyment is the prime essential, as well as, the final test of all art. Here again the human voice is the best interpreter. The "towering port" of Milton and his sublime moods can best be conveyed through the melodious roll of his epic thunder; a rich, well-modulated voice is needed to suggest the calm enthusiasm and the serenity of soul embodied in the stimulating sentences of Emerson; Ruskin's enthusiasm for things of beauty can best be transmitted by a voice in tune with his feelings toward art and nature. For him the hills have a voice, and the streams become musical. Nothing but the voice is needed to express the spirit and mood of the ballad:

Merry it is in good greenwood,
When the mavis and merle are singing,
When the deer sweeps by, and the hounds are in cry,
And the hunter's horn is ringing.

Nothing must be allowed to interrupt the sweep of the poem when the spell is on. Hall warns us against linguistic manicuring, Judd against the dangers of dissection, and Chubb against discursiveness, miscellaneousness, and an over-use of the dictionary. Any kind of study that gives a fragmentary impression of a masterpiece is fatal. All true works of art have some kind of unity. It may be unity of movement, of purpose, of thought, or of emotional background; and whatever it is, it must be felt, otherwise there is no artistic appeal. Moreover, the youthful intellect and impulses rebel against delays and anything that smacks of quibbling. To sum up what has just been said, there is always danger of mistaking the means for the end by studying the form instead of the content. All effort must center in getting the *meanings* and *values* intended by the author. Arlo Bates uses a splendid figure: "When the gods send us gifts, let us not be content with examining the caskets." [1] The gifts referred to are fundamental social and moral laws imaginatively embodied in concrete human characters and social situations.

The English instructor who teaches both composition and literature feels warranted in making the work in literature contribute to the purposes of English expression; that is, he believes that he may advantageously call attention to the literary technique of the authors studied. This is a natural and helpful correlation; but the teacher must be aware that here lurks the very danger we have been considering, ap-

[1] *Op. cit.*

pearing in another and more subtle guise; attention drawn to splendid literary technique is just as diverting as any other focusing on mere matters of form. Inglis has distinguished very clearly and helpfully between (1) educational values of production and accomplishment, and (2) educational values of consumption, utilization, and appreciation. Ignoring this fundamental and practical distinction has led to much confusion in the long-continued discussions of the question as to what knowledge and training are of most worth. Except for a few gifted pupils, the function of literature in the high schools is clearly utilization and appreciation. For reasons indicated in the preceding chapter, the many must be trained merely to express themselves correctly and clearly, and only a small percentage will produce writing with literary value. If giving attention to the literary skill of an author will cause the pupils better to sense the atmosphere, music, spirit, and beauty and thereby better appreciate the content of his writings, then it is certainly justified, because any procedure that will stir the imagination and enlist the proper emotions must not be neglected.

In pedagogical discussions concerning the teaching of literature, the impulses and mental powers thus far considered in this chapter have generally been given due recognition; but this is not quite the whole pedagogy of the subject. If our efforts with the boys and girls in our high schools fall short of reaching their *wills*, we fail in a vital matter; for in the last analysis, "the will," as Wundt asserts, "is at the basis of everything; it is the essence of the human soul, the primary phenomenon of psychical life." The will is the unifying principle of individual thinking, feeling, and acting, a kind of common denominator. William James, who was a deep student of everything human, recognizes the function of the will in appreciation, when he says,

"The answer of appreciation, of sentiment, is always a more or less, a balance struck by sympathy, insight, and good will." If the will is good, there is spiritual health, and this is beyond price when compared with technical and accurate information.

In the study of literature, as in any other activity, the will is involved as both cause and effect. Unless the pupil's will-attitude toward the work can be made kindly and fruitful, little except harm can result; and unless the outcome of his study is a tendency toward better living based on a saner and more wholesome view of human relations, the pursuit of literature is, from the point of view of society, which pays the cost, a barren procedure. How, then, is the study of literature by our high-school pupils made to function favorably in relation to their will-attitudes? It certainly cannot be done by exhorting or moralizing. The adolescent naturally does not respond to preaching; he wishes to keep a private conscience and settle social and moral questions for himself. His will is reached in a less direct way. To influence and train the will, like other educational efforts, means to employ psychological laws in the interest of the purpose to be accomplished. As Münsterberg affirms, our actions are "the product of our own motives and their normal connections. All our experiences and our thoughts, our inherited dispositions and trained habits, our hopes and our fears, coöperate in our consciousness and its physiological substratum, our brain."[1] There is a psychological series: imagination, feelings, thought, will—these are causally connected. Thus it is the teacher's work to arouse and extend the imagination; for this is the beginning of the series, which, in dealing with literature, should include rational admiration. As Taine asserts in his *English Literature*, "there is a fixed connection

[1] Münsterburg, Hugo, *Psychology and Life*. Houghton Mifflin.

between what a man admires and what he is." What he is, determines what he does, and this is the end of the series. Stating it otherwise, if we continually bring beautiful images, noble thoughts, exalted emotions, and worthy deeds to the center of our pupils' field of consciousness, results inevitably follow; holding fast to ideas and ideals properly emotionalized shapes the will. As William James expresses it in his *Psychology*, "There is no sort of consciousness whatever, be it sensation, feeling, or idea, which does not directly and of itself tend to discharge into some motor effect; any higher emotional tendency will quench the lower ones." Psychologists have called this the "expulsive power of higher emotions."

Thus the will is reached through the functioning of the impulses and the mental powers; and these, as we have seen, may be exercised in a wholesome and fruitful manner by intelligent, whole-hearted reading, when

> *We gloriously forget ourselves, and plunge*
> *Soul-forward, headlong, into a book profound,*
> *Impassioned for its beauty and its salt of truth.*

The teacher who stimulates his pupils to read in the spirit suggested by Mrs. Browning need never despair of reaching individual wills and thus influencing lives.

The reader without teaching experience doubtless wishes to come to closer terms with the daily classroom procedure. In trying to give help in the teaching of any art, it is difficult to be definite without being misleading. Literature is so broad, so many-sided, and so human, and the responses from the different group combinations are so varied and often unexpected, that the teacher's quickness of perception, resourcefulness, and judgment must decide on the spot what should be done. However, a few suggestions may be helpful.

VI

As in dealing with any situation where something worth while is to be brought about with human beings, the mode of approach is important. If the teacher and class are meeting for the first time, it is very necessary that the teacher obtain information relative to the pupils' previous reading both in and out of school, what they have read and especially how they feel about it. These data can be obtained with little trouble by using a series of questions; and the information should be in hand before any permanent plans are made for the work of the class, for it is naturally a determining factor as to both content and method.

When it is decided what shall be read first, the teacher's initial task is to create in his pupils the proper attitude of mind. This includes arousing expectation, which may be done in many ways: by briefly telling something typical of the piece—something about one of the characters, the circumstances under which it was written, the author's point of view, or a suggestive and stirring quotation, such as

> *Sound, sound the clarion, fill the pipe;*
> *To all the sensual world proclaim*
> *One crowded hour of glorious strife*
> *Is worth an age without a name.*

In some cases a favorable state of mind may be encouraged by giving the pupils the proper background of the selection, especially when this can be made interesting and can be connected with the pupils' knowledge or experience. The literary, historical, or emotional setting may help to create a fitting attitude and contribute much to interpretation and appreciation. However, in the full sense of the term, feeling the emotional atmosphere of literature must come gradually

as the reading progresses. Establishing the proper attitude may be thought of as an appetizing process before serving the food.

At the beginning, it is well to remove evident stumblingblocks and thus reduce mental friction. However, this must not relieve the pupils from their legitimate part of the work; this aid is only meant to free the imagination and to clear the way for vigorous and independent thinking. This phase of the work may include such matters as unusual or remote allusions, names of people and places beyond the knowledge of the pupils, and facts necessary to intelligent reading but not readily obtainable. The aim is to avoid delays and help the pupils to get a comprehensive view of the entire piece as soon as possible, so that they will be sure to feel the unity of the whole. If not needed for appreciation, details may be attended to later in connection with a study of the nicer and more elusive points. This attention to the larger thought elements first is demanded, as we have seen, by the manner in which the adolescent mind works. Plot or what corresponds to it appeals first, then the more important characters, later the harmonizing emotional undertone or atmosphere.

The class period in literature is certainly not to be spent in lesson hearing or mere testing of preparation; the testing must be incidental but none the less real. Practically the only function of the recitation in literature is to aid the pupils through their own activity to understand and enjoy *what* the author says, not *how* he says it. This aim is in keeping with the interests of youth and it is in harmony with the purposes of great literature. From this it follows that nothing must be done or said that does not in some way help the pupils to understand and appreciate. If the teacher discusses the author's sentence structure, his diction,

his technique, or the general qualities of his style, all must contribute directly and definitely to a mastery of the thought and feeling. If such matters as meter, rhythm, scansion, onomatopœia, or alliteration are noticed explicitly, it must be with a view to leading the pupils to a better appreciation of the beauties of the poetry; and understanding the beauty of form must lead to an appreciation of beauty of content. If figures of speech are named and analyzed, it must be to clear the meaning and intensify the pleasure. Biographical information need not be introduced unless it really sheds light on the literature in hand. The history of literature or the life of the times may be used only when they are needed to furnish a setting. And it is difficult to say how the derivation of words can be made safely to contribute to better appreciation.

The French have been very successful in teaching the uses and appreciation of their mother tongue; consequently their method is worthy of note. After his extensive study of the schools of France, Rollo W. Brown says, "Despite all that has been written about the French people's worship of form, they are chiefly interested in substance." [1] The teacher's energy is used in helping the pupils to get the meaning. In this their teaching is psychological, and the results prove that it is practical.

In the light of what has been said, the teacher's questions will seldom be asked for the purpose of getting information. Because of the nature of the subject and its functions, the questions will vary greatly as to form and purpose. On the whole, they will be so managed as to stimulate aggressive thinking and set free the imagination; they will do this by helping the pupils to bring their own sense perception and social experiences to bear on their work. The questions will

[1] *Op. cit.*

often be suggestive and, most important of all, will stir the emotions by awakening proper associations and firing the imagination.

Very often the question may be so put that it can be answered by quoting or reading from the literature under consideration. Questions with a bookish trend are unfortunate, and questions that are task-suggestive do not foster the free and pleasure-seeking spirit that is conducive to the purposes of the work in hand. Reading is never fully normal and hence fruitful to the limit unless the outcome is pleasure or some form of satisfaction.

Every question must in some way help the class to participate vicariously in the thoughts and feelings of the author; that is, the class must sympathetically live through his spiritual experiences as he portrays some phase of life for them.

The questions will be so managed as to keep before the pupils' minds a well-proportioned, sane, optimistic view of life; life's values must be kept true by directing the thoughts to sound standards. Herein lies the great value of the best literature for adolescents. By skillful questioning, they may be made to see social and moral relations through the eyes of the clear-seeing men and women of the ages; and their emotional natures are made to harmonize with the heartbeats of those who have felt strongly. This means that the pupils' thoughts and feelings are kept much of the time above their natural level; yet their responses must be absolutely sincere and without reserve—a delicate business for the one who directs.

As in other subjects, the discussions should focus on one thing at a time; but everything should be taught in relation to the whole, since unity is the prime consideration in all forms of art. Although the questioning is done in such a manner as to keep the class

alert, there should be an air of leisure about it all, for people are not in an appreciative mood when they feel hurried or driven.

Since continuous enjoyment is the criterion, it is important that the questions be so distributed and the reading so managed, that, as far as possible, the class work will move forward smoothly and entertainingly. There cannot be much time spent "siphoning the vacuums"; tedium defeats the immediate purpose, and, if continued, results in ultimate harm.

But what if the utmost skill in guiding the discussion fails? The well-prepared teacher always has one resource that cannot utterly fail if the literature is well chosen. Everybody with ordinary intelligence enjoys good prose and poetry when well read. This is true even if the thought is not fully understood. Youth finds life very pleasant, but there is much about it that he cannot completely fathom. The "concourse of sweet sounds," the sense of rhythm, the varying resonance of a well-modulated human voice—the mere sensory charms of good oral reading—make a natural appeal especially during adolescence. As the French express it, "the ear is the pathway to the heart." The psychologists have proved that many of the reactions that constitute appreciation are genuine physical responses. By a suitable series of adjustments, the responses come through the nerves, the muscles, the varying flow of blood, and the functioning of the glands. When the auditory stimulus is pleasant and meaningful, a sense of satisfaction results and the auditory taste is trained. There is no substitute for appropriate, soulful oral reading; compared with it, the printed page is cold and impersonal. It is therefore part of the teacher's equipment to be able, as Chubb claims, to read "clearly, with pleasant tone, and good enunciation, and with the feeling, the sincerity, the

earnestness, and the artistic conscience that are born of the desire to awaken in young hearers a love of the master." [1]

To do successfully during the class period the things here suggested, the teacher must not only have the necessary scholarship and training, but he must decide upon a pretty definite plan of classroom procedure. (1) The assignment, which is a vital part of the plan, consists of such suggestions and definite, stimulating questions as will call for thoughtful, imaginative, sympathetic reading on the part of the pupils. In some cases the assignment may consist of a reading of the lesson, or a portion of it, by the teacher, the pupils' part being suggested as the reading proceeds. (2) The teacher should frequently make a mental inventory of the pupils' informational and emotional stock, in order that he may bring this to bear on the interpretation and appreciation of the lesson. In Herbartian phrase, he must stir the apperceptive mass. (3) In the interest of concentration and with a view to definite accomplishment, the teacher should formulate for himself a purpose, not the general purpose discussed in this chapter, but a definite purpose to be realized through the medium of the assigned lesson. This he will do usually by throwing the emphasis upon some particular aspect or phase of the lesson; for example, clearing up an intricate place in the plot, making sure that the pupils are gaining a sympathetic understanding of certain characters, stirring their feeling for the atmosphere of the piece, getting the social and moral situation clearly in mind, or, more important, evaluating the social and moral elements involved. (4) To be effective and satisfying, the class exercise must give the pupils an impression of completeness. This effect will be produced by carefully planning a teaching unit

[1] *Op. cit.*

for each lesson; both the assignment and the presentation should recognize some unifying idea as the unit of instruction. In dealing with a piece of literature of considerable length, the teacher uses a logical division into natural teaching units; with short pieces like lyrics, it means a thoughtful grouping into teaching units. (5) To foster clear thinking, first on the part of the teacher and later on the part of the pupils, the teacher must carefully organize the elements of the story, the character material, the setting, the necessary auxiliary information, and anything else that is needed. Both the interests of the pupils and the purpose of the lesson must control the organization of the teaching material so that the organization may be psychological rather than logical. Experienced teachers very well know that even the most perfect lessons are generally modified in the teaching.

Let us summarize the thought of this chapter. If the teacher of literature gives to his high-school pupils, according to their varying capacities, the truth, the beauty, the worthy sentiments, the far-reaching feelings, the grandeur, the idealism, the knowledge of social and moral relations, the insight into spiritual values, and the joy contained in such literature as they are able to read appreciatively, he becomes a truly creative force in their lives; and, like the reverberating messages of the great masters of prose and verse, his echoes will

roll from soul to soul,
And grow for ever and for ever.

CHAPTER XIV

FOREIGN LANGUAGES

I

For the purpose of this chapter, we may say there are at present five foreign languages taught in the secondary schools of the United States. In the year 1923–1924, the number of pupils enrolled in these languages placed them in the following order: Latin, French, Spanish, German, Greek. These languages are elective in nearly all the schools where they are taught, and there are about eighty-three per cent of the schools that offer one or more of the foreign languages. Latin and French, which etymologically are so closely related to each other, are studied by four-fifths of the pupils who elect foreign languages. Whatever one may think regarding the value of foreign language study when compared with the other high-school subjects, their pedagogical importance is established by the fact that nearly two million pupils in our secondary schools are pursuing them and that the pupils give more time to the preparation of their language lessons than to their other subjects. Exclusive of the pupils of the seventh and eighth grades, the private schools enroll larger percentages in each of the five languages than the public schools. Because of local conditions and sentiment, the percentages of enrollment in each of the foreign languages vary greatly among the states; for example, in the public schools of New Mexico, over fifty-three per cent of the pupils are studying Spanish, while several states enroll less than two per cent. The Latin enroll-

ment ranges from 3.9 per cent in Utah to 55.8 per cent in North Carolina. The French enrollment in New Hampshire is about fifty-two per cent, but four states enroll less than three per cent. In forty-one states, Greek does not have a place in the public school program of studies; yet 1.3 per cent of the pupils in Rhode Island are studying Greek. Since the World War, German seems to have disappeared from the public schools of twenty-four states, while the schools of Massachusetts enroll 3.1 per cent. The percentage of enrollment in the private schools is nearly double that of the public schools. These statements suggest the relative importance of the topics discussed in this and the two following chapters.

No one would maintain that the value of the foreign languages as compared with other high-school subjects has been settled by any scientific investigation. The unbroken history of the foreign languages in our secondary schools, coming down from the colonial period, may be said to establish a favorable presumption; but it surely furnishes no proof of their educational value. Since Spencer's vigorous attack on the study of the ancient languages, partisan discussions have been continuous and often bitter. As a result of these and the other more substantial causes, principally the increase in number of "vocational" subjects and the influence of the War on German, the percentages of enrollment in the senior high schools have changed during the seven years between 1914–1915 and 1921–1922 as follows: Latin has lost 9.8 in the public schools and 1.9 in the private schools; the loss for Greek was respectively 0.2 and 2.4; the loss for German was 23.8 and 19.1; the gain for French was 6.7 and 5.8; the gain for Spanish was 8.9 and 9.0. There appears to be no way of determining why French and Spanish have increased, though it may be the result of the falling

off of Latin and German. It is certain that there are many patrons of our public high schools who doubt the wisdom of spending so much time and energy on a "dead language," but who, nevertheless, believe that the study of a foreign language contributes certain elements to an education which other subjects do not furnish; hence they naturally turn to either Spanish or French.

The most common reason assigned for preferring a modern language is that of practicability; it is *assumed* that, because these languages are written and spoken by a large number of people now living, there will be many chances to use them in a direct and practical way. When asked to be specific concerning this reason, the people who make the assumption are in trouble; investigations show that the percentage of language students who ever speak, read, or write a foreign language to an extent worthy of consideration is so small that this assumption is not warranted by facts. However, the fact that Latin has long ceased to function in a natural way and the consideration that only a very few who study modern languages in high school make any direct use of them cannot be taken as proof that all foreign languages should be dropped from our high-school program of studies. There seem to be good reasons, both psychological and linguistic, for believing that the educational values peculiar to language study can be attained by the pursuit of any well-developed language with a worthy body of literature; hence much that is said in this chapter applies to the study of either the ancient or the modern languages.

In seeking light on the matter of content and method, as in the case of other high-school subjects, we may well begin by attempting a careful statement of (1) the aims and functions of language study and (2) the way they minister to the nature and interest of pupils of high-school age.

II

The ultimate aims and values of the foreign languages as educational means have been so frequently and so fully stated that discrimination in this field is difficult. The tendency has been toward an overstatement of the values; the claims have been too numerous and too vigorous. For purposes of study and discussion, classification of some kind is helpful; but in practice, as all thoughtful teachers of the languages know, the aims and values merge; that is, when we attain any worthy aim, other aims are of necessity reached, one value implies others. The values of almost any subject can be classified as direct and indirect, as specific and general, or as instrumental, disciplinary, and cultural. The American Classical League, through its advisory committee, makes effective use of the last-mentioned mode of classifying the aims and objectives of language study. The abilities and values here discussed are nearly all familiar to any one who has read the literature of the matter under consideration.

1. Under instrumental objectives or values, it is justly maintained that the study of any foreign language with a well-developed syntax, a refined vocabulary, and a worthy literature will serve as an effective means of increasing one's ability to use one's native speech. A competent use of the mother tongue in this country includes the ability to understand and appreciate the meaning of English words and sentences and the power to express one's thoughts and feelings correctly when speaking or writing. No adequate justification of this claim can be attempted here; the chief arguments center around the nature of language in general and the laws of mental growth—in this case, adolescent mental development.

The earnest effort that a pupil must make in ex-

pressing the thoughts found in reading any foreign language compels him to use the words he already knows discriminatingly and to seek other words to meet his growing needs. Any human effort which makes vigorous demands on any power tends to increase that power in both amount and precision. Adequate translation of a foreign language, therefore, tends to enlarge and improve one's English vocabulary. Moreover, in Latin and the languages derived from it, the observing pupil finds the originals of many good English words and thus under proper guidance adds to both his active and passive vocabulary. The Thorndike-Grinstead count indicates that fifty-two per cent of the 17,303 English words occurring most frequently in the material studied are of Latin origin; when the pupil meets the Latin originals of these words, he naturally increases his vocabulary by adding the English derivatives. The Thorndike-Ruger studies, covering a period of two years, investigated the growth of several thousand Latin and non-Latin pupils as to their knowledge of English words of direct Latin origin. These studies showed that the pupils who have pursued Latin one year made an average increase in their knowledge of English derived from Latin two and one-half times greater than the non-Latin pupils of "the same initial ability"; and for the pupils who had studied Latin two years the average growth was several times greater.

Improved vocabulary carries with it other forms of growth in the mastery of English, one of which is increased ability to understand and appreciate spoken and written English. Thorndike studied the influence of first-year Latin upon ability to read English. His studies covered a period of two years and were based upon tests run with Latin and non-Latin pupils. In some schools, the Latin pupils made a growth in their ability to comprehend English only slightly superior

to non-Latin pupils of the same initial ability; but in other schools, the difference in growth favorable to the Latin pupils was very marked, the increased superiority being due apparently to the use of better methods.

However, training in the adequate translation of foreign languages produces its most marked effects in the form of an increased correlation of all the powers involved in speaking and writing the mother tongue effectively. The reasons for these effects are far-reaching and somewhat numerous; only a few can be noted.

In Chapter XII, emphasis was placed on the fact that language is an instrument for *thinking* as well as for expressing thought and that these two functions are subtly interdependent. From this it follows that any mental effort that results in better thinking or which supplies better thought materials naturally reacts favorably on the power to express thought. As Inglis has pointed out, "the very facility with which the pupil employs his mother tongue in ways adequate for the ordinary affairs and conveniences of everyday life is one of the greatest handicaps to the attempt to convert it into a more effective intellectual instrument."[1] Why should he strive to improve his language when it seems to be entirely adequate to his common needs? Evidently there should be something in our curriculum content to make him realize his linguistic shortcomings and to induce him to make the effort necessary to overcome his deficiencies. As has been pointed out in a previous chapter, the ordinary exercise in oral and written composition, which merely provides for expressing the pupil's own best thoughts, is seriously inadequate, since we have no way of knowing what his best thoughts really are. The mental and emotional life of high-school boys and girls is much richer than

[1] Inglis, Alexander, *Principles of Secondary Education*. Houghton Mifflin.

they are able to express; hence they do the expedient thing and make their expressed ideas fit their power of expression; and from the nature of the case, the teacher of English composition is helpless. Does not the thought content of any worthy foreign literature supply a means of compelling pupils to get and express high thoughts and worthy sentiments?

In order that translation shall function in this instrumental manner, it must deal with continuous discourse, and it must be more than a mere substitution of one set of verbal symbols for another. It is here implied that there are two complete and complementary processes: namely, (1) comprehending and appreciating the thought and sentiment conveyed through the foreign language, and (2) giving adequate expression to these in the mother tongue. In this two-phasal effort of getting and giving thought, the pupil has no chance to sidestep, since his teacher knows even better than he does what he is trying to express. It is a means of continually pushing the pupil to his linguistic limit; in all activities, the greatest growth comes from the greatest well-directed effort. It will appear later that the method of teaching a foreign language should be such as constantly to tend toward the realization of this ultimate objective.

Students and observers of educational procedure have long questioned the efficacy of grammatical rules and principles when tested by their influence upon one's ability to write and especially to speak correct English; and the teaching of English grammar is frequently defended on other than strictly practical grounds. Faith in old-fashioned abstract grammar is largely gone; yet we feel the need of a substitute. To be worthy, a substitute must be more interesting, and it must function in its effects on English speech with a higher degree of certainty. It is the opinion of

Dr. Judd that "a clear understanding of the structure of the vernacular will doubtless survive as one of the most important reasons for teaching foreign languages." [1] In the study of one's native speech, the ability to make formal logical analyses is not a practical or worthy objective; yet correct use of English demands that one somehow come to have a "feeling" for correct structure; and many, like Judd, believe that this general language sense can be acquired better by our pupils as they struggle with the structure of some foreign language, the theory being that they must know something of another language in order to understand and appreciate in a subtler and surer way the refinements of English speech.

Latin, because of its many syntactical recognitions of the finer shades of human thought and feeling, and because of its constant expression of word functions by means of word forms, has long been considered a language peculiarly suited to this purpose. This belief seems to be justified by both the Thorndike and the Bates studies. According to the first, pupils who had studied Latin one year made a gain in ability to understand and to explain correct usage ten per cent greater than non-Latin pupils of the same initial ability; and according to the second study, which was based on "a controlled experiment in the teaching of English grammar through Latin," the pupils who pursued Latin as one of their major subjects made a greater gain, as indicated by a series of grammar tests, than the non-Latin pupils. Moreover, when this was made a conscious objective and methods were adapted to this end, the gain in practical grammatical ability resulting from the study of Latin could be more than doubled. At present, there is a lack of definite classroom material suitable for the purpose of teaching grammatical

[1] *Op. cit.*

English by the application of Latin grammar. Success in this matter must therefore depend largely upon the resourcefulness of the teacher.

There are also minor claims relative to the effects of foreign language study upon the use of English; some of these are increased ability to spell English words of foreign derivation, increased ability to use technical terms derived from the language studied, and ability to understand foreign words, phrases, and quotations embedded in English writings. These claims have been pretty well substantiated by controlled experiments.

Some of the effects of language training that we have been considering are due, as Judd has pointed out, to the advantages that a foreign language has over the mother tongue, in that it "lends itself more readily to a scientific study than does the vernacular. The point of view that one has toward his vernacular is an intimate unscientific point of view; he is not explicitly aware of the fact that language has structure." [1] We habitually take our native language as a matter of course, as we do our personalities, as just part of us, hence not a fitting and natural subject for serious study. When we do focus on our own speech, we naturally assume toward it the artist rather than the scientist attitude. On the other hand, we are able to approach a foreign tongue in an impersonal, that is, in a scientific spirit. From this psychological fact it follows that a foreign language can be made to function in the instrumental ways that we have been considering.

But we may move in our thinking to a higher level and say that on general principles any study that involves the consideration of linguistic forms and relations tends to function in ways that are favorable to the understanding and use of one's native tongue.

[1] *Op. cit.*

As Dr. Hall has suggested, "all speech is one and has the same cerebral center." Like other experiences, the extension and diversification of one's language experiences lead to their natural effects, which are all the various forms of linguistic growth and development, hence the influences claimed for the study of the foreign languages.

It is often argued that modern languages are needed as instruments for study, that one cannot keep abreast of foreign thought and discovery without the ability to read the recent literature pertaining to his field of effort. This is true of a very small percentage of people, a percentage so small that this value must be considered as extremely contingent, hence not a valid objective. This is proved by all the studies that have been made.

2. In passing to the consideration of the disciplinary values of foreign languages, we are entering an old battle ground, where two decades ago two camps of educators and psychologists exhausted all the available resources of that day in their efforts to establish and defend their respective positions. It was a war in which all who trusted in mere "discipline" seemed to lose. But we are not concerned here with the history of that strife, except to note that the educational psychologists and others certainly do not now formulate their views on this matter as did the victors in that pedagogical-psychological conflict. As in our study of this question in connection with high-school mathematics, we shall profit by focusing briefly on the present status of knowledge and opinion relative to disciplinary values, especially the values that are an outgrowth of linguistic studies. In doing this, we soon find that there are available very little concrete data. We are considering very real and important but intangible things, to which thus far statistical treatment has not been applied and for which pedagogical measuring rods have

not been invented. Because of the dearth of concrete proof, we are forced to turn for help to expert judgment, and, in the interest of truth, this must be the judgment of unbiased experts; naturally the teachers of the foreign languages, like specialists in every field, are prejudiced witnesses whose testimony has little value. Because of the nature of the questions involved, we turn to the scientifically trained educational psychologists. Because of the fields of study in which they work, we seem to be justified in trusting their judgments, both as to the general problem of disciplinary values and as to the probable transfer of any traits that may be developed through the study of the foreign languages.

Psychologists generally are in agreement on the following points, which certainly must be taken into account in any discussion of the disciplinary objectives of foreign language study: Any adequate test will show that transfer does take place; experiments have not been devised that are capable of showing the full amount of transfer; the amount of transfer is conditioned largely by the method of teaching; transfer of training is a valid aim in all teaching; transfer is more certain in connection with general habits, attitudes, and ideals than it is in relation to content elements, the general elements serving as carriers, concepts of method, ideals of procedure, and the like. Dr Judd's statements appear to summarize what other psychologists have said: "Transfer is a form of generalization, and training can be given so as to encourage generalization." The fundamental elements involved in transfer, so far as one can judge from the varied statements of the experts, seem to be of a moral nature, using moral in a broad sense. This means that they are very general. If common content elements are to carry over into other fields, they "must be brought specifically to the pupil's attention, generalized into a

principle, and the application of the principle to other fields made clear." This is Woodworth's way of stating the case.

In discussing the application of these expert opinions to the disciplinary aspects of the foreign languages, we shall do well to follow the report of *The Classical Investigation*, assuming that the teachers of foreign languages find little that is objectionable in the foregoing condensed statement of disciplinary effects. In the judgment of the present author, the principal foreign languages now in our high-school program of studies differ much less as to the ways in which they actually function, or can be made to function, than is generally believed by intelligent people who have not studied the question; that is, the indirect, general results of language study are the only results that are not clearly contingent as to values, and these indirect results are obtainable from good teaching of any foreign language. If this be true, the statements of the committee of the American Classical League relative to Latin apply to the disciplinary objectives of any language.

The first disciplinary objective formulated in the report of the League includes the following: habits of sustained attention, orderly procedure, overcoming obstacles, and perseverance; ideals of achievement, accuracy, and thoroughness; and the general attitude of dissatisfaction with failure or partial success. All agree that it should be the aim of every high-school subject to develop these very desirable mental and moral traits; but the close inner relationship that obtains between the language work of the succeeding semesters and the nature of the difficulties encountered have led many students of this question to believe that the foreign languages are naturally well suited to develop the habits, ideals, and attitudes included in this

objective. Chapter X of the *Report of the National Committee on Mathematics Requirements* deals with the theory of correlation; and A. R. Crathorne of the University of Illinois, who contributed this part of the report, calls attention to the higher degree of correlation between the sequential courses in Latin and all the other sequential subjects; and another study by Professor Crathorne finds a closer correlation, as indicated by grades, between first-year Latin and the subjects of the following three years than is found in other first-year studies. Is the close correlation due to common content elements or to general habits formed in the study of Latin? Some would explain this close correlation by the higher average ability of Latin pupils. At any rate, practically all psychologists whose opinions were obtained believe that the mental traits listed above "are subject to spread in fields outside of Latin."

The second disciplinary objective is the formation of "the habit of discovering identical elements in different situations," thus making correct generalization possible. When we compare English with the foreign languages generally studied in this country, we find these identical elements numerous and not very difficult to discover. Much more effort and skill is needed to develop in high-school pupils the habit of discovering identical elements when the circumstances are extremely diverse; yet this is necessary if the habit is to be made general and thus widely useful.

The third disciplinary objective proposed for Latin, and it would seem equally valid for the other foreign languages, is "the development of correct habits of reflective thinking applicable to the mastery of other subjects and the solution of analogous problems of daily life." This means the kind of thinking that aims to reach conclusions sufficiently trustworthy to

be followed by action, the kind that selects pertinent facts and uses them in solving practical problems, thinking that recognizes significant relations in perplexing situations and from these discovered relations derives a final inference. This kind of thinking usually includes suspended decisions pending the consideration of all the facts and data that may have a bearing on the conclusion. The mental processes involved in discovering the thoughts expressed in a foreign language are readily identified in this account of reflective thinking. If the mental processes are the same, translating from a foreign language must be one way of developing this kind of thinking. It is now agreed that the methods best suited to develop the ability to read and understand a foreign language are the methods most likely to lead to the attainment of this objective; that is, the surest methods of realizing the primary objective in the study of foreign languages are the methods most likely to secure the desired transfer of acquired mental traits to other fields. These methods will be described in the two following chapters.

3. The proponents of foreign languages usually make claims relative to cultural values of the languages that appear to have little support except the opinions of trained linguists. As Inglis has pointed out, these masters of the languages have had extended contact with the literature of the languages they know so well, and they naturally overestimate the values derived from the limited study by high-school pupils, because they "interpret those values in terms of their own extended acquaintance with the language, literature, and life of the people whose language is studied." [1] The amount read is so small, and the difficulties encountered by high-school pupils are so numerous and so continuously distracting, that one may reasonably

[1] *Op. cit.*

question whether a point is often reached even by the most capable pupils that justifies us in believing that the content values are important for cultural purposes. If the content value for cultural purposes is great, this can be gained from excellent literary translations, these translations contain the thought expressed with accuracy and appreciation, and they convey more of the spirit of the foreign literature than the distracted pupil can get from his early attempts at translation.

For those who have watched the labored efforts of high-school pupils "digging out" their translations, especially during the first two years, the usual cultural claims, when considered in relation to other means of obtaining the same results, appear little less than ridiculous. We may well pause to question what is meant by "culture" when applied to educational values. The reader doubtless accepts this statement from *The Classical Investigation*, to the effect that culture is "concerned with increasing the pupil's fund of information, developing his capacity for appreciation, extending his intellectual horizon, and broadening his sympathies"; that is, when the word is used in the discussion of modern educational problems, we should have in mind subjective changes and realities, regardless of the means by which these changes and realities were brought about. This is holding to the original meaning of the word, and it makes growth and development the real objectives, rather than acquaintance with "the best that has been thought and said," as Matthew Arnold expressed it. But doubtless many object to that part of the report which says that culture comes about by "direct contact, through the study of their language and literature, with the mind of people remote in time and place." This seems to say that the best way to secure culture is to seek out those things in the history of the race which are old and geographically

removed. It is difficult to follow the line of reasoning that would lead to the conclusion that "remote" intellectual pabulum which has long been in storage is best suited to the needs and tastes and thus promotes the growth of boys and girls in their teens.

Assuming that culture is the result of growth however produced, that is, that it is *functional* culture we are considering, let us run through the list of objectives generally urged by those who seem to feel that they must defend the study of the foreign languages to the limit. The cultural objectives proposed are usually about as follows: historical perspective, increased appreciation of the influences of other civilizations, better understanding of social and political problems, increased appreciation of allusions to traditions and historical events, correct attitude toward social situations, better appreciation of literary qualities and technique, personal traits of the authors studied, knowledge of the general principles of language structure. The people who urge these traits and this knowledge as valid objectives doubtless possess both the traits and the knowledge, and we may readily grant that these are the results of wide reading and study in one or more of the foreign languages; but this does not prove very much as to the effects of high-school work in the foreign languages. Moreover, if these are valid educational aims, it would seem a common-sense procedure to seek these aims in a more direct way, for example, through the study of history and other social and political subjects. As pursued in secondary schools, the study of foreign languages gives as by-products some of the results here mentioned, but only in a very small degree. A few hours of well-directed reading would supply the information and fix the points of view and the attitudes aimed at in high-school Latin; and it is difficult to conceive of the ordinary high-school

pupil, as he struggles with the many perplexities of vocabulary, form, and syntax, giving much thought to his author's literary characteristics and technical skill.

Because, in his efforts to get the thought of a foreign sentence, the pupil from the beginning is frequently forced to give heed to grammatical considerations, it would seem that, for psychological reasons, a knowledge of the general principles of language structure might be regarded as a valid ultimate objective. Because of the way we learn our native language, we use it with assurance, giving little or no attention to the grammatical ideas and principles involved, many of which are universal; surely an understanding of these ideas and principles and an appreciation of their universality must have educational value. Because foreign languages, and especially Latin, indicate functional differences in ways quite unlike English, the pupil is forced continually to observe words and groups of words as having functions in addition to the mere meanings which they separately convey. If the method of instruction continually focuses on the identity of grammatical principles common to the foreign language and the mother tongue, the pupil should gradually come to understand the universality of these principles and incidentally gain a more scientific attitude toward his own language. So closely is language related to thought and feeling that we must include in our concept of culture anything that leads to growth in *general* language power.

This section of the chapter has been occupied thus far with the ultimate objectives of foreign language study in our secondary schools. It only remains to state what we are to consider the immediate objective. As may be inferred from the extreme variation in the number of pupils pursuing the different languages in

the different sections of the country, there is a marked disagreement relative to the primary function of the languages. Even a superficial study of the geographical distribution of the modern languages taught in the United States leads one to believe that the speaking (possibly including the writing) of a foreign language is considered the immediate aim. If this is the case, the objective is not valid, because, as will appear in a later chapter, it cannot under present conditions be attained. All experience and all studies of the matter indicate that the only immediate objective that may reasonably be considered valid is a "progressive development of ability to read and understand" the foreign language. Fortunately, as will be pointed out later, all the ultimate objectives can be attained most surely by the use of materials and methods suited to the attainment of this primary objective; failure in realizing this objective means a large degree of failure in reaching the various ultimate objectives of foreign language study. This interdependence of the immediate and ultimate aims will be evident when we pass to the consideration of content and method.

If the teacher of any foreign language is to be more than a routinist, he must choose the content of his courses and determine his methods of approach and presentation in the light of carefully ascertained worthy objectives; it has been the purpose of the foregoing discussion to place clearly before the reader such objectives and to be suggestive as to the means most favorable to the attainment of these objectives.

III

Let us seek further light in determining content and method by noting briefly some of the facts and principles applicable to the teaching of foreign languages to high-school pupils that are furnished by modern

psychology, especially the psychology of adolescence. If in presenting the various objectives, we have done violence to the nature of adolescents, we have sinned grievously. The following statements seem to be pertinent and should be serviceable in guiding the thinking and practice of professionally minded teachers.

In youth, intellectual curiosity and enthusiasm are naturally dominant and need guidance; at this time much growth through zestful experience is possible. The social urge is strong, and the social instincts usually are reaching their maximum. The emotional life often runs high and can be made a powerful ally. During adolescence, the emotions and the intellectual habits naturally tend to become thoroughly integrated. In the mental life of the adolescent, incentives play an important part; thus there must always be apparent an immediate incentive to ensure efforts commensurate with the task demanded; for example, the mastery of forms and rules is sought only when their need is actually felt.

In the opinion of Pechstein and McGregor, psychologists agree that "general intelligence reaches its normal maximum of growth during adolescence." The "capacity to perceive, discriminate, remember, imagine, form concepts, and execute acts of judgment and reason, etc., reach their maximum on the average somewhere around the age of fourteen and one half to fifteen." [1] However, for our purpose it is important to bear in mind that the analytical powers of the mind do not fully mature during early or middle adolescence. Many high-school pupils are ready to do "consecutive and self-correcting thinking"; but they cannot be expected to enjoy what to them seems mere vexing puzzles in word matching and deductive acrobatics.

The psychology of the period suggests that as far

[1] Pechstein, L. A., and McGregor, A. L., *Psychology of the Junior High School Pupil.* Houghton Mifflin.

as possible all phases of foreign language study be based upon thought processes rather than memory. This means that the teaching must utilize the pupils' past experience. The rules and principles are to be obtained largely through much genuine reading experience, definite training is to be given in applying to other fields the facts and principles developed in the study of the foreign language, emphasis is placed on functional knowledge of the forms and principles taught rather than upon formal elements, and the language studied must be treated as a vehicle of thought and not as something to which we attach rules or as something through which we juggle the many changes in word forms; that is, language is nothing, whereas ideas are all important. This last injunction, emphasizing thought rather than memory, is but an example of that phase of adolescent psychology to which reference has frequently been made: namely, that content is more interesting and must take precedence over form. Unfortunately for some aspects of language study, drill as such is not an adolescent method; hence, vocabulary, forms, and rules must function during the learning process. Of this more will be said in connection with method.

At no stage in the educational program is it so important to keep in mind, as Slaughter urges in *The Adolescent*, "that the object of education is human quality and human adjustment, and that these are lost to view so long as progress is measured in terms of subjects." Adolescence does not demand that a certain number of pages of Latin or French be read each semester, but that some interesting language problems be solved, some conscious increase in power be gained, giving a feeling of real progress that can be measured in terms of human products rather than in terms of the languages mastered.

The psychology of youth demands that the work in a foreign language, like any other school task, be humanized. The logic of a narrative that is true to life is always more appealing than the logic of the most subtle syntax; as Woodrow Wilson once wrote, our pupils must be "given a just conception of this man Cæsar," a fop, a lady-killer in his youth, a likable and incomparable commander in full age, a man who fought and then wrote while the deeds were fresh in his mind—"*any*thing to dispel the idea that Cæsar wrote grammatical exercises in hard words."

What has been said in this chapter concerning the status of the foreign languages in our secondary schools, their immediate and ultimate objectives, and the part of adolescent psychology that seems applicable to the work of teaching the languages, furnishes a natural basis of solution for the many problems that arise in attempting to determine the content of our language courses and the methods we should use in teaching them. The controlling principle must always be the interests and capacities of pupils. He who teaches John a language must know John.

CHAPTER XV

LATIN

I

Of all the foreign languages taught in the secondary schools, Latin seems in recent years to have been subjected to the most vigorous attacks. The charges against it are that it is a "dead language" and that the pupils pursuing Latin give more time to it than to any other subject, the time and effort being out of proportion to the benefits derived. No attempt is made here to justify the retention of Latin in our program of studies; readers who are interested may find the defenses well stated in the scholarly report of *The Classical Investigation*. However, in passing, one might raise the question as to whether the bandying of epithets on the part of the enemies of Latin has proved convincing. The discussion has, in turn, raised the question whether any language is really "dead" in the fullest sense of the word when such a large percentage of all the sentences spoken or written by the most lively of the living generation contain words so much like the Latin in form and meaning that even a beginner in Latin recognizes the identity and rejoices in the feeling and force which these words enable him to put into his expression; and the same question may be asked concerning a body of literature whose influence still carries in it so much that is modern and living. Again, one may ask, how does it happen that all the studies show that high-school pupils are willing to give more effort to Latin than to

the other subjects? Is it the content, the method of teaching, or the character of the teachers?

The only significant question is, does the *relative* value of Latin justify the time and effort devoted to its study by high-school pupils? This question has never been answered, and its discussion cannot be undertaken here. The fact that thirty per cent of the pupils in the senior high schools of the country are enrolled in Latin, that many of these pupils are of the highest initial ability, that Latin attracts a larger number than all the other foreign languages combined, and that over seventy-seven per cent of the 20,500 secondary schools of the United States have classes in Latin which are taught by 22,500 teachers establishes its pedagogical importance and hence its claim for attention in a book that deals with the major subjects.

The opponents of Latin frequently take comfort in the fact that during the seven years ending 1922 the number of Latin pupils in the senior high schools decreased nearly ten per cent. However, the falling off in percentage is fully accounted for in the first chapter where the changed character of the student body of our public high schools is described. As there noted, our schools have attracted many pupils that a few years ago would not have thought of a high-school education; and a majority of these pupils have chosen vocational curricula or have entered types of schools where Latin is not taught.

Such is the status of Latin in the American secondary schools. What is its status across the Atlantic? In Germany, the language question has not been settled. There are two conflicting tendencies. One expresses the materialistic spirit inspired by Kaiser Wilhelm, looking, in educational matters, toward the German language, literature, and history as the only worthy foundation on which to build an educational program;

the other tendency, influenced by the classical achievements of German scholars and educators, looks toward some combination of classical and German culture. England is sounding no doubtful note. The Education Act of 1921 provided for a wide extension of secondary education with government assistance. The Prime Minister's Committee made a thorough study of the classics and their place in British education and embodied the findings in an elaborate report, the result of which is the extension of classical education in the secondary schools, the British labor leaders coöperating. In schools aided by government grants where two foreign languages are taught, Latin is usually included. In France, after twenty years of experimentation "with varying programs of study, classical, semi-classical, and non-classical, and after prolonged discussion in view of conditions before, during, and since the World War, France has decided that the classics are to be required in the lycées as an essential part of liberal education." In his letter to President Millerand in 1923, the minister of public instruction explains how this decision is justified. "Experience and not theory is what counts in this case. It is experience that shows the defects in a plan of studies. Those disciplines which it has tested and approved are the surest, even though they be the oldest." In the Chamber of Deputies, the debates on the plan extended through successive sessions for more than two months; but the opposition was political rather than educational. This new plan is "the most thorough piece of educational reconstruction done since the war in any land." Thus, on the whole, there has been a movement in these countries to make Latin an integral part of secondary education.

Whatever may be one's views relative to the wisdom of giving Latin a place in our secondary schools, the foregoing considerations call for a study of the problems

involved in determining the content of the courses and the methods of presentation best suited to realize the purposes of Latin in our educational scheme. From the point of view of all that has gone before, these purposes will certainly be realized if the subject matter and the methods are such as to minister to the immediate interests and needs of our high-school pupils. This is the surest way of attaining the immediate and ultimate aims of Latin.

II

For specific suggestions concerning the content of high-school courses in Latin semester by semester, the reader is referred to *The Classical Investigation*, pages 144–162, where he will find a very comprehensive statement of the Latin that should be read and the things to be done, as determined by the latest consensus of opinion based on many studies and investigations. It is the purpose of this section to offer a few criteria that should control the choice of content and to suggest the applications of psychological principles and the Latin objectives already outlined to the work of building a Latin curriculum.

Since in teaching adolescents, the thought content is so vital as compared with mere form, provision should be made as early as possible for reading continuous Latin; from the standpoint of youthful interests, this has many advantages over isolated sentences expressing detached thoughts. Care is needed to obtain easy Latin; that is, not only continuous in its thought elements, but also abundant and well graded. It must be adapted to the interests of boys and girls of high-school age; it should exhibit variety of form; and it should provide considerable repetition of vocabulary and syntax. The value of this reading material is measured by its effectiveness as a means of developing

the power to *read* Latin. The adolescent must feel that he is growing in the use of this power; that is, all his work must be measured in terms of his advancement rather than in terms of the subject matter.

Not only should the first Latin be continuous and well graded as to vocabulary and structure, but it should deal with subjects that are naturally interesting and adaptable to high-school pupils. Since the subject matter is the controlling consideration with adolescents, interest depends largely upon the choice of topics. The early adolescent is naturally a hero worshiper and is readily thrilled by stories that are heroic in character; such were the stories and legends taught to the youth of Rome. These were used to impress Roman standards of virtue, and they made a strong appeal to the imagination of the youth who was about to gain the privilege of wearing the *toga virilis*. These same stories and legends appeal to the chivalrous spirit of American adolescents and should be incorporated early in our Latin courses. The same may be said of any ancient theme in which the human elements dominate; these elements have compelling interest for the youth of all ages. Any highly dramatic event appeals powerfully, and such events are numerous in the annals of Roman tradition and history. These are easily turned into simple Latin for the use of our pupils. The sentences should be simple and short at first and gradually move in complexity toward periodic structures, similar to those found in the classical authors included in high-school Latin.

Whatever the conduct of the adolescent may be, he is interested in morals and likes to discuss moral issues; hence the Roman fables and anecdotes that incorporate ideals of personal loyalty and the Roman standards of conduct readily interest pupils of high-school age. Because of the human interest, the lives

of the early Roman leaders have much content value when used during the first two years. Later in the career of a Latin pupil, he may receive much enjoyment from narratives dealing with the home life and the wit and wisdom of the Roman people. These themes are recommended primarily because of the way they appeal to youth, hence because of their effectiveness as a means of developing ability to read Latin; and these topics, when suitably treated, should contribute in a limited way to the attainment of the historical-cultural aims of Latin teaching. Many themes of the type suggested can be presented in Latin based on the originals but adapted to the capacities of high-school pupils. Although the analytical powers are not highly developed, the early adolescent readily responds to the logic of a closely knit narrative. Although he may not be ready for analytical thinking, he can do consecutive thinking with much satisfaction and profit.

Mere drill is naturally distasteful to the typical youth; yet experienced teachers of Latin have found it best to teach a small initial list of carefully selected words before asking pupils to read continuous narrative. Much of the work on this initial vocabulary can be done orally; meaning and pronunciation can be taught advantageously at the same time. Much of the needed stock of words can be given in simple sentences, a few of the grammatical forms being taught simultaneously with the meaning of the words. Function, form, and sound may well be learned together. This suggests, as part of the course, a limited use of Latin conversation. Whatever the method and material used, the primary purpose, which is the progressive ability to read, must always be in view; development of this power supplies the *sense of progress* necessary to act as a youthful incentive. It is generally believed by teachers of Latin that, if ability to read and understand is made the im-

mediate objective, the result, at the end of the first year, will be a larger vocabulary both active and passive; hence the needed equipment for successful reading the second year.

If we recognize the intellectual interests of our pupils, the same inductive principle that we have been considering will be applied to the teaching of Latin syntax. As the work in reading moves forward, only such rules and principles should be taught as are clearly needed. When there is a felt need, the youth naturally makes an effort to meet the need. This emphasis upon functional rather than formal knowledge will probably result in reducing the number of syntactical principles learned during the first year. The present author once spent much time and devoted much energy to identifying and labeling grammatical constructions found in the writings of Cæsar, Cicero, and Vergil. This was insisted upon regardless of how adequately the meaning had been obtained and expressed; in fact, this labeling operation always followed the translation. This procedure can be justified only on the ground that it is the best means of helping pupils to understand the meaning of Latin that he knows how to translate, and the studies thus far do not warrant this assumption. When a practical difficulty in translating arises, the teacher must judge whether the difficulty can best be overcome by teaching the syntax involved. If a knowledge of the rule is really necessary, then the pupil will have a natural and an immediate incentive for learning the needed rule; then it becomes a zestful experience favorable to growth rather than a formal requirement; and, best of all, this functional way of determining and teaching the syntactical content of our Latin courses ensures a close connection between mere knowing and the thought processes involved; that is, thought comes to the aid of memory.

The friends of Latin insist that the highly inflected nature of the language makes a splendid educational implement; be this as it may, it is certain that form is made to function continually in the minds of our pupils. This can be accomplished with certainty, as in learning words and syntax, by continually connecting change of form with change of use and restricting the forms taught to those which contribute to the development of reading ability. We must continually appeal to the intellectual curiosity of high-school pupils, and our efforts in this direction will be furthered by continually treating language as a vehicle of thought. The whole aim is getting ideas and meanings, form and syntax being only the means to the end. Without doubt restricting the word forms to be learned to immediate needs will reduce the number of forms taught the first year. This should be conducive to thoroughness, something especially necessary in first-year language study.

Thus far in our discussion of content little reference has been made to ultimate objectives. This omission is justified, because, when rightly understood and attained, the immediate aim carries with it the ultimate aims. The two are connected and mutually supporting, and, as already suggested, their interdependence should be recognized by the use of subject matter suited to the attainment of both immediate and ultimate aims.

The practice in other countries and the opinions expressed by many of our experienced teachers tend toward the conclusion that three semesters may well be given to the use of the kind of material here suggested. It furnishes the best possible preparation for the classical authors; and, more important, it is a direct attempt to meet the immediate interests and needs of early adolescents so far as this can be done by the study of Latin.

For many pupils this delay in reading classical Latin is fortunate. The interests and capacities of middle adolescents are better suited to the level of ideas and the content found in the classical authors generally used. In this period, our pupils show more self-assertion than in their earlier years; their sense of values is increasing, and in many cases a splendid idealism is blossoming. All this tends toward an appreciation of the best in Latin literature and more assurance of success in a rather strenuous undertaking. The choice of classical reading material should be guided by the principles already stated. The Latin selected should be easy, so that youthful self-assertion may function in much successful independent effort, and so that the quantity read may be sufficient to realize the primary objective, that is, the progressive development of the power to read and understand. The Latin used should have much human interest and be social in its outlook, in order that the adolescent social instincts may be satisfied vicariously. The Latin chosen may well contain stirring oratory and poetry that embodies Roman ideals at their best. There seems to be a growing conviction that much of Cæsar should give place to reading material with content better suited to the immediate needs of high-school pupils; but the Cæsar tradition dies hard. In case Cæsar's wars are given up, however, there is a great deal of suitable material from which to choose.

In order to increase the cultural and historical values of Latin, but mainly to increase the interest in the content of the Latin read, it is desirable that pupils do considerable English reading that deals with the same topics as their Latin. This collateral reading should begin as soon as classical authors are read, and it should be made an integral part of every Latin course. The report of *The Classical Investigation*

contains suggestions for a wealth of supplementary reading material.

In the light of recent educational thought, there can be little doubt as to the criteria for determining the content of our Latin courses. Nearly all agree that we must build into our courses such material as is best suited to meet the *present* interests, needs, and capacities of our pupils, and that our success will be attested and measured by the degree of success we attain in developing ability to understand Latin suitable for reading by high-school pupils. But it remains to be seen whether we have the practical wisdom needed to apply these criteria upon which we are agreed; it involves much insight as to adolescent nature, supplemented by much experimentation.

III

In discussing the method of teaching high-school Latin, the same point of view will be maintained and the same principles will guide that controlled our consideration of content. The natural interests of adolescents, so far as they are known, are of the first importance in deciding questions of method. These interests seem to point clearly to such methods as will best develop ability to read and understand. In *The Classical Investigation*, the chapter on methods of teaching secondary Latin gives much space and emphasis to the ultimate objectives; to the present author, this does not appear psychological. The psychology of adolescence demands that the pupils shall continually feel that they are making progress in thought-getting, content being always the great desideratum. In the ultimate objectives outlined in the preceding chapter are included, it is true, certain practical aims, and, on the whole, the practical appeals to youth. But some of the aims, from the point of view of the

pupils, are too remote; and, on the whole, we should find it difficult to make the pupils feel that their attaining of these aims is *continuously progressive.* A glance at the list of instrumental, disciplinary, and cultural aims will reveal many aims that do not have any direct appeal for high-school pupils. It would be neither interesting nor practical to divide the time and energy of the pupils during the class period among the various ultimate objectives; such a method would fritter away the time and dissipate the energy of the class, and the recitation would lack a unifying principle.

The power to get thought from a foreign language naturally seems to the pupils a worth-while purpose. Therefore, when all matters pertaining to the method of presentation are determined, the focus will always be on the immediate primary objective: namely, developing the power to understand Latin. It will be apparent, as we proceed in pointing out this method, that the attainment of many of the ultimate objectives is a logical outgrowth of this power. If this is the pedagogical relation between the immediate and the ultimate objectives of high-school Latin, the recognition of this relation is more definite and more logical than to assume simply that "the development of the immediate and ultimate objectives should be continuous, concurrent, and interdependent." We shall find that our success in realizing the ultimate objectives will depend on the character of the subject matter as well as upon the method.

To make the reading of Latin as Latin the primary aim demands connected Latin from the first, and experience has proved that this is practical. It is possible, too, that reading content, even from the beginning, may serve to motivate all study. Assuming that we have selected a paragraph of simple connected Latin with which to introduce the study, what are the first

steps? There is no exact agreement as to detail. As indicated in discussing content, experience warrants the teaching of a small initial vocabulary needed for this first reading. These first Latin words and their meanings may well be taught orally to foster interest and lead to correct pronunciation. At the beginning, and frequently throughout the four years, the pupils should receive help on the advance assignment. It is not desirable to make any sharp distinction between "sight translation" and the lesson assignment. It is profitable to spend much class time showing the pupils just how to attack the problem of getting the meaning of a Latin sentence. After the work is well under way, the teacher's judgment, based on his insight into the knowledge and natural capacity of his pupils, must decide the amount of help that will be profitable. If we continue to show our pupils the best method of translating Latin, do we not largely remove the temptation to resort to illegitimate helps? Correct habits of independent study are the natural safeguards against any tendency to be dependent. Successful independent effort of any kind is always satisfying and stimulating, and with pupils of ordinary ability and energy, some degree of enthusiasm for independent effort should grow by its own momentum.

The majority of Latin teachers who filled out the general questionnaire of the Classical League believe that, generally, the Latin sentence should be read in the Latin order. The arguments for this method are numerous but cannot be given here. The analytical method of attacking a Latin sentence, which has so long been taught and practiced, is not suited to the stage of intellectual development of early and middle adolescence. In making the attack analytically, various academic formulas have been followed, none of which have seemed to appeal to high-school pupils.

These formulas all involve a specious orderliness and logic foreign to the mind of the ordinary youth. The Latin sentence has a logic of its own which is determined by the genius of a highly inflected and periodic language; and this logic, because it represents the order of thought and flow of feeling (the true content) of the Roman mind, makes a natural appeal to the adolescent mind, which readily recognizes and relishes realities. What could be more formal and scholastic, hence ill suited to the logic of the learner, than the following formulas, based on purely grammatical concepts? First hunt for the subject (which is often not found, because not expressed), then the predicate (a rather general term for practical purposes), then the modifiers of the subject, then the modifiers of the predicate; and then attack the subordinate clauses in the same manner; finally put all these fragments together in some sort of English order. The procedure may correspond to the movements of a mature academic mind, but it scarcely seems possible that this formal scheme ever originated in the mind of any one who had had long sympathetic intellectual intercourse with adolescents.

When seeking the meaning of a Latin sentence, and this is to be done before attempting a translation, the words should be taken in their natural Latin order and given careful attention as to the function which the form suggests. Although the result is often not the English order, the meaning of the sentence is generally apparent; and with help and experience, the pupils will come to feel the way the author's mind moved and found fitting emphasis for important elements or reached some worthy climax. This method calls for almost daily practice in understanding at sight, and this practice will stimulate and encourage the pupils to have confidence in their growing ability to cope with the problems involved. Pupils rapidly gain faith in

themselves, and they enjoy the responsibility for the success of the enterprise. The confident attitude which the skillful use of this simple method develops is surely an important by-product. Along with this self-assurance should grow the scientific habit of suspended judgment, for very often the word forms suggest more than one syntactical function. Consequently the pupil must await additional data.

For the understanding of a highly inflected language like Latin, considerable accurate knowledge of word forms and grammatical relations is indispensable. How are the forms and the grammatical principles to be learned and firmly fixed in mind? The practice of Latin teachers answers this double question in various ways. The prevailing method through the centuries has been abstract memory and drill. Learn by rote the declensions and conjugations, study the grammatical rules with their classical illustrations annexed, then say or write them until the forms and rules are permanently fixed in memory. Thus equipped pupils are expected to apply deductively their knowledge of the forms and rules to the translation of Latin sentences.

In 1898, the committee of twelve of the Modern Language Association discussed in a very helpful way the various methods that have been applied to teaching foreign languages. The natural method is based on the assumption that high-school pupils should learn Latin or any other language in the same way they learned their own language, which, be it noted, required about ten years of continuous practice. For many reasons this method is not practicable. The so-called psychological method appears to be in keeping with much that psychologists have taught since the days of William James, and it is in harmony with the intellectual interests and needs of adolescents. According to this method, Latin words are closely associated

with the things which they represent. This is a natural and excellent teaching principle but capable of rather limited application, since no combination of objects, pictures, gestures, bodily movements, and pantomime can furnish a concrete basis for every word. The principle is subject to the limitations of time and conditions. The second guiding principle of the psychological method, as extended and elaborated in recent practice, calls for an inductive approach to learning the meanings and grammatical forms of words and to an understanding of the rules of syntax needed in translating.

This principle seems to be psychologically sound, and it has proved fruitful in practice. It is especially well suited to pupils of high-school age. The child and the preadolescent may profitably be given dogmatic instruction and formal drill till the knowledge is firmly fixed; dogmatic teaching and formal drill as such are not adolescent methods. On the other hand, the adult, because of his maturity of mind and his training, easily assumes an analytical attitude toward his tasks. But the natural motives for the adolescent are found in the thought and emotional content and the functions of language constructions. Applying this psychology to the teaching of Latin, the meanings of nearly all words are learned from their use in Latin sentences, the grammatical forms are met first as they function in expressing grammatical relations and distinctions, and the syntactical rules and principles are learned by reading Latin which contains examples of their application. For thoroughness, there must be something to take the place of formal drill; for high-school pupils, this is frequent repetition of vocabulary, forms, and constructions as they occur in connected Latin. Thus after the pupil has made a beginning, he learns new word forms and constructions by first meeting them in

the midst of an enlightening context, and he fixes them in memory and makes them his own by continuing to meet them as they function in expressing worth-while ideas. From first to last, the emphasis is on meaning and use; this applies alike to cases, moods, tenses, and grammatical constructions. It would appear that the whole procedure is scientific. The pupil learns new elements (words and forms) in the medium of familiar elements; and when skillfully managed, he participates in the discovery of the rules and principles which he needs immediately, his need being the natural incentive to effort; then as far as possible, he assimilates these words, forms, and principles by making daily use of his knowledge concerning them.

Without doubt one of the best ways of fixing grammatical forms and principles after they have been acquired is through the use of oral and written Latin. Of course, all beginner's books provide for written exercises. Such exercises should be carefully limited as to vocabulary and rules of syntax; and for purposes of interesting drill, they should include considerable repetition. For evident pedagogical reasons, *The Classical Investigation* recommends "that during the first years of the course the greater part of the work in the writing of Latin be done during the class period under supervision of the teacher, and that a discussion of the syntactical principles involved and some oral practice with sentences illustrating the principles precede the writing."

Shall we not require our pupils to memorize paradigms and rules? Yes, when the paradigms are summaries of the forms they have learned through reading experiences and when the rules are a formulation of their own discoveries. Pupils of high-school age are not greatly interested in mere forms and abstract generalizations. When pupils have learned through

experience the function of the forms that belong to the same system, and when they have clearly stated in their own language the relation between grammatical structure and thought and feeling content, then it may be well to learn the systems to which the word forms belong (declensions and conjugations) and repeat, for the purpose of fixing in the memory, the inductively derived rules and principles.

When teaching the Latin forms, constructions, and their functions, no alert teacher neglects to draw upon the pupils' knowledge of English. Very often the grammatical principle needed in dealing with a Latin sentence can best be developed through English sentences embodying the principle, thus making a natural connection between the known and the unknown.

If in all this the content seems to the pupils interesting and significant and if the approach is inductive and functional, the work will carry with it the most natural motive for effort. If this effort is constantly directed toward the discovery of identical elements in different situations, our pupils should not only develop ability to read and understand Latin, but also habits of initiative and independent thinking. If the ability to understand Latin is felt to be continuously progressive, there should result an attitude of courage and self-assurance. Thus a cumulative development of habits and attitudes is derived which we hope will carry over into other fields of effort. In other words, this method of teaching pupils to read and understand Latin seems to be the very best way to realize the various disciplinary objectives already discussed.

IV

Forty-five minutes is the usual class period. How shall the time be used?

Perhaps the most important part is that used for the

lesson assignment, using assignment to include everything that will aid the pupils in doing their work. Telling the class what to do usually requires only a few seconds; showing the pupils how to do it often claims many minutes; hence the assignment may well come at the beginning of the period. The pupils need a small book in which to write the teacher's directions and suggestions. A vocabulary assignment should include pronunciation and a context for the new words. When convenient, new words are associated with the objects, qualities, or actions they express, or with English derivatives or known Latin words, thus supplying whatever enlists the pupils' interest; this usually means applying the laws of apperception and anything else that tends to make the pupils work along functional and associative rather than mechanical lines. If new word forms are assigned, the pupils should be instructed relative to more than one use of these forms; the illustrations may be oral, written, or printed, and some of them should find their way into the assignment books. If the next lesson is to focus on a syntactical construction, appropriate settings must be supplied, and the function of the construction should be the chief point of attack. The pupils should at the same time feel the need of the new construction. When translations are assigned, much insight on the part of the teacher is needed to determine how much help to give, the varying ability of the pupils being the chief cause of difficulty. The teacher needs to give his pupils concrete illustrations as to methods of attack, definite suggestions as to special problems in the assignment (for example, the use of grammatical constructions involved), and discussions that will encourage the pupils to work first for the thought expressed rather than for matching Latin with English equivalents. Thus the purposes of the assignment are to encourage correct habits of studying Latin,

to aid in developing desirable attitudes toward the work of preparation, to help the pupils make use of their previous experience, and, most important of all, to arouse much interest in the specific thing to be done. If all these purposes can be accomplished, the assignment is worthy of the teacher's best effort. The amount of work assigned will depend upon the year of the course and the ability of the class. A maximum and minimum assignment will aid in meeting the needs of varying capacities.

If the immediate objective of Latin is to be attained, much class time must be given to sight translation. As defined above, this may be considered part of the lesson assignment, since it should aid in the preparation of outside work and reduce the time required for study. If well managed, this part of the work serves many purposes; but the chief purpose is to teach pupils how to get the thought from Latin sentences; the expression of the thought obtained is another matter: namely, an affair of English. The best material for sight translations is easy continuous prose. Generally the Latin order should be followed; not necessarily the verbal order but the order of word groups, which is the same as the order of the thought units. The teacher must be alert in following the thinking of the pupil who is translating, so that he may ask him questions that are sufficiently stimulating. This is a matter of provoking effective thinking. Thought-inciting questions are leisurely yet businesslike. The necessary current of thought must not be interrupted to give incidental information, for translating is an affair of thought getting. The procedure may be informal. Although the pupil is treated as a discoverer, he is led to a predetermined conclusion. The pupil must be led in a way that appears natural to relate unfamiliar elements to familiar experiences. This includes the many ways of

making out the meaning of new words without looking them up. The problem of getting the thought contained in the Latin furnishes much opportunity to form the scientific habit of suspending judgment till adequate data are at hand. The entire class must be held responsible for the results, and the teacher's questions should be framed with the whole class in mind.

The translations that follow illustrate the possibilities and advantages of adhering to the Latin order. The meaning is clear and the emphasis intended by the authors is properly placed.

This reply having been given, he withdrew. The next day the camp from that place they move. The same does Cæsar and all the cavalry to the number of four thousand, which from all the province and the Ædui and their allies he had collected, he sends ahead those who are to see in which direction the enemy are marching. They, too, eagerly, the rear having followed, in an unfavorable place with the cavalry of the Helvetians join battle; and a few of ours fall.
—Cæsar, *Gallic Wars*, I, 15.

Whom you, Melpomene, once at his birth with kindly eye have looked upon, him not the struggle at the Isthmian games will make renowned as a boxer, nor the spirited horse, in a Greek chariot, draw to victory.—
Horace, IV, Ode 3.

Arms and a hero I sing, who first from the shores of Troy
To Italy, fate-driven, and to the Lavinian coasts came.
Much he both on land was tossed and on the deep,
By the powers of the gods above, on account of cruel Juno's unforgetting wrath.
Much, too, in war he suffered, until he should found a city,
And bring his gods to Latium, whence the Latin race,
And the Alban fathers and walls of lofty Rome.—Æneid, I.[1]

[1] Translations by Katherine E. Carver, Latin Department, Illinois State Normal University.

After thus getting the meaning of his author, the pupil's next step is to express the thought in idiomatic English, retaining as far as possible the emphasis expressed by the Latin.

It was once the practice to use nearly the entire class period in translating the assigned lesson, the time being greatly lengthened by asking many questions concerning the grammatical forms and constructions. This practice is out of harmony with the primary aim—developing ability to read and understand—and with the natural adolescent idea of progress. If the pupils' preparation has been careful and inspired by the main purpose of getting the thought contained in the Latin, the time devoted to prepared translation may be greatly reduced. The teacher should so manage the recitation as constantly to recognize the two distinct steps involved: (1) grasping the thought and feeling of the Latin and (2) expressing in idiomatic English the content of the Latin. The pupil must learn to feel that no mechanical exchange of English for Latin words will give the true content of the Latin; this must come largely through classroom experience. Stringing together the English equivalents of the Latin regardless of meaning cannot be tolerated; but since adolescents are naturally intent on the meaning, meaningless combining of words ought not to be a performance characteristic of high-school pupils. When the review is read, or when the translation is written, higher standards of English may be demanded. As in English composition, the class should be made responsible for the language used, for the problem is at all times the same as that which confronts the teacher of English.

Is there time during the class period for Latin conversation? Dr. Hall tells us that the pubescent is thrilled with the sense of aloofness that comes from using an unknown language, although this motive soon

weakens. Conversation is justified on the ground of adding variety to the class work and of serving as an effective means of drill. The psychology of youth demands that the necessary drill as far as possible be something else besides mechanical or routine. By using simple conversation, the skillful teacher manages to drill his pupils in pronunciation, vocabulary, word forms, and common syntactical usage. This part of the work may well be informal and largely incidental. It is an interesting exercise for the first two or three minutes of the period or any unplanned portion of the time. The same use may be made of Latin songs, hymns, and memory verses.

Although the procedure in the Latin classroom should be orderly and continually directed toward understanding and reading Latin, much variety should be introduced, no fixed routine observed. The work must have immediate interest and be a preparation for independent effort outside the classroom. The high-school pupils of the country spend ninety minutes a day on the preparation of their Latin assignments, and this must not be dull or waste effort.

CHAPTER XVI

MODERN LANGUAGES

I

The modern languages found a place in our high-school program of studies during the nineteenth century. At the beginning of the present century, when the percentage of pupils enrolled in Latin began to fall off, there was a corresponding increase in the percentage of pupils enrolled in the modern languages, French increasing about 5 and Spanish about 15 per cent. The great decrease in the study of German during the war rather than the falling off in Latin seems to be the real cause for the increase in French and Spanish. Careful estimates show that during the year 1921–1922 the percentage of enrollment in French was 15.5 in the public senior high schools and 32.5 in private schools; for the same year, the percentage of enrollment in Spanish was a little over 11 in both public and private schools. The study of French and Spanish is increasing in the seventh and eighth grades: in 1923–1924, the aggregate for French was 18,600 and for Spanish 8400. In 1922–1923, 53.4 per cent of the senior high schools of the country offered French, and 25.3 per cent offered Spanish. These figures indicate that there is a large number of teachers and prospective teachers interested in the problems involved in teaching the modern languages and that there is a large number of pupils whose educational welfare depends upon the success of these teachers.

Among the ultimate objectives proposed by the

advisory committee of the American Classical League is this: Latin should be taught in such a way as to increase "the ability to learn other foreign languages, especially French, Spanish, and Italian." Because of the common elements in the vocabularies, and, as shown by the McGory study, because of the many common principles and details of grammar, Latin has a positive correlation with French; the Kerby study, dealing with the relation between the study of Latin in high school and the success with first-semester French in college, reached the conclusion that "the correlation between intelligence and grades in French was very little greater than the correlation between the study in Latin and grades in French. This means that, given the intelligence necessary for college entrance, Latin study is about as important a factor for success in French as is superior intelligence." From this correlation it follows that the teachers of French, and in a less degree the teachers of the other Romance languages, have an important ally in the Latin language if they will but make use of it. If a high-school pupil is to study both Latin and a Romance language, for many reasons it will be better to have one or two years of Latin first, except in cases where the modern language can be begun early and learned by the direct method. Although a knowledge of Latin aids in mastering some of the modern languages, combining Latin and non-Latin pupils in the same class increases the problems growing out of individual differences.

From the statistics quoted in this and the preceding chapter, it appears that all the modern languages combined enroll about the same number of pupils as Latin, and that high-school officials, supported by the sentiment of both pupils and parents, are favorable to a generous use of foreign languages and look upon them as important educational instruments. Probably no

one now asserts that a foreign language is essential to a high-school education; however, one might maintain that a knowledge of one or more of the foreign languages is a vital element in the education of certain individuals. Because such individuals are enrolled in our high schools and because of the many educational values that grow out of any enthusiastic effort to learn a foreign language, both public and private schools must retain the languages as electives; and because of the inherent difficulties involved in mastering any foreign language and the vast body of facts and principles that must be learned, the schools must provide teachers that are well prepared in both subject matter and method.

II

Who should study the modern languages? The question cannot be answered dogmatically. Bobbitt rightly suggests that the whole matter at present must be settled on the basis of probability, "rather than upon the findings of an analysis of actual language uses." [1] To justify the place of foreign language on our high-school program, we are warranted in demanding that it, as well as other studies, must be a vital educational experience suited to the nature and interests of adolescents and that it must function *during* the learning process.

A statement of the values claimed and the aims proposed in modern language study is needed at this point. Such a statement should help to answer the questions of who, what, and how.

It has been customary to claim vocational values for the modern languages. This was the claim made for German in the Middle West, and it is now the claim frequently heard for the study of Spanish. Without any definite effort to ascertain the facts, some people

[1] Bobbitt, Franklin, *How to Make a Curriculum.* Houghton Mifflin.

assume that certain modern languages are much needed in trade and international intercourse. Any teacher of the languages who follows the careers of his pupils knows very few if any instances of vocational uses. Training in the use of the languages cannot be justified on vocational grounds.

It is often said that French and German are needed in advanced studies, especially a reading knowledge for students of science; this is what Inglis calls their "propædeutic function." For American high schools this value is highly contingent and will not justify us in retaining any of the modern languages in our program of studies, since important foreign studies of modern problems are very soon accessible through adequate translations.

Nearly all Americans who have traveled in Europe have experienced rather serious inconveniences when visiting countries whose languages they cannot speak. But judging by the past, we are safe in assuming that a very small percentage of the 910,000 who were studying French, German, and Spanish in 1923–1924 will ever go to Europe; and nearly all who are fortunate enough to go abroad are sure to find their speaking knowledge decidedly inadequate. Clearly the uses for travel do not warrant the giving of two to four years to the study of any modern language.

In 1831, Longfellow delivered an address at Bowdoin College in which he asserted that one "becomes a citizen of the world" by speaking many tongues and that it is worth the necessary exertion "to trace the progress of the human mind through the progressive development of language," and to learn how other nations think, feel, and speak. Our delightful poet evidently had in mind what we now call the cultural values of the languages, but it is obvious that he was speaking of linguistic knowledge far in advance of that

usually attained in any high school. Much of the time and energy of the high-school pupils is of necessity devoted to mastering pronunciation, vocabulary, and rules of syntax, rather than to gaining a knowledge and appreciation of alien peoples through their literatures. Perhaps the modern languages do function culturally in other ways, but much depends on our definition of culture. Doubtless an enthusiastic effort to master any foreign language increases one's language sense, and this is cultural in its effect.

Nearly all studies thus far made seem to indicate that the pursuit of any foreign language tends to increase one's grasp of the vernacular. In Goethe's opinion, "he who knows no foreign tongues does not understand his own." In the case of French we should expect much fruitful correlation with English because of the large number of common elements. The Thorndike *Word Book* contains 10,000 English words that occur most frequently in the carefully selected reading material examined; of these forty-one per cent came into our language directly from the French. The study of any foreign language naturally increases one's knowledge of the simpler general principles of language structure. Moreover, the relation between language and thought is so close and vital that we should look with favor upon any study that increases our power of oral or written expression.

In Chapter XIV, certain disciplinary values growing out of foreign language study were discussed. When properly taught, the modern languages should help to develop the desirable habits, ideals, and attitudes there considered.

III

Nearly all who discuss the pedagogy of modern languages, as well as those who teach them, either claim or assume that the primary objective is the same

as that in teaching English; that is, our aim is to make our pupils skillful in the oral and written use of the foreign tongue and to give them some knowledge and appreciation of the literature of that tongue. Complete skill in the use of any language includes thinking in it, understanding it when spoken, speaking it, reading it, and writing it. Now, if any one who teaches or observes the teaching of any modern language in our secondary schools will ignore what he may think the purpose of this teaching ought to be and proceed to determine by any reasonable means of testing what actually happens, he will readily learn that not one of the five abilities mentioned is really attained in two, three, or even four years of study. He will find generally that the pupils reach the most proficiency in reading and understanding the language, the relative degree of success depending upon where the emphasis has been placed and the method of instruction used. Why this failure to reach our objectives? Simply because, under the conditions of high-school teaching, the objectives are wholly unreasonable; they are based on our desires rather than our thinking. No one except those who have mastered a foreign language realizes the extent or the nature of the difficulties involved. We seem to forget our own experiences in language getting, which extended through our childhood and youth, when our capacities for spontaneously acquiring speech were at their best and when we had little to do in our waking hours except to play and learn our mother tongue; and this learning was done largely on the play level.

The high-school class period is forty-five minutes. Under favorable conditions there are fifteen pupils in class. If the teacher were to remain silent during every period and give the pupils their three minutes each for *practicing* the new *art*, then each pupil would

have about three seven-hour days during the entire school year in which to learn and practice under supervision the strange tongue; and if he continues four years, he will have less than three weeks in which to master a difficult art. These suppositions belie the facts. Class enrollment is not restricted to fifteen; it is not the function of the modern-language teacher to remain silent throughout the recitation period. A persistent use of stop watches would show that on the average the pupil taking a four-year course does not practice speaking and writing the new language during class time more than the equivalent of two days. Enthusiastic people who insist that the abilities to think, to speak, and to write a modern language must be included in our list of objectives fail to take into account both conditions and actual results. Without doubt for a few people these are the phases of linguistic knowledge and skill that are the most practical and satisfying; we usually speak much more than we read or write, and one's feeling is "warmer" for a language he speaks and writes than for one that he only reads, for the printed page is cold and impersonal. But these considerations do not alter high-school conditions, nor do they affect the psychology of language teaching.

If, then, we cannot reasonably expect high-school pupils to become skilled in the arts of speaking and writing a modern language by spending three-quarters of an hour five days a week for two, three, or four school years, what may we expect? It seems reasonable to count on pupils learning such phases of a modern language as can be acquired largely outside the classroom. The Uhl studies show that Latin teachers are able to get many of their pupils to spend ninety minutes daily on the preparation of their lessons. If teachers of the modern languages were equally successful in stimu-

lating their pupils to study outside the classroom, we might count on about two hundred forty clock hours of effort devoted to acquiring one use of the language. Since very few high-school pupils when outside the school have the advantage of speaking the language they are attempting to learn and since still fewer have any natural call to use the language in writing, it would appear that the efforts of our pupils must be confined largely to solitary study. Hence, what can they do other than learn from the printed page to read and understand the language? Thus, for a large majority of our high-school pupils, as in the case of Latin, this is the only reasonable immediate objective; and this ability will be usable in proportion to the degree of skill acquired, since foreign books and papers may always be had. The ability to read a modern language, when once possessed, need never be lost. Moreover, all the educational values mentioned above, as well as others, may be considered valid ultimate objectives, the attainment of which depends largely upon the reading materials selected and the methods used.

The urging of the ability to read a modern language as the only immediate objective doubtless seems extremely reactionary to many readers who have come to consider the natural method, the psychological method, or the direct method as representing the most approved way of teaching high-school pupils. In the discussions that follow, it will appear that none of the advantages that accrue from the use of any of these methods is to be neglected; interest and progress in reading may best be fostered by a judicious employment of the principles characteristic of these modern methods, since these principles are in accord with the psychology of adolescence.

IV

If ability to read a modern language is our primary objective, the character of the reading material must be carefully determined, in order that it may be suited to the interests and abilities of high-school pupils. The same may be said relative to the other content elements of the course. As one reads the prescriptions and discussions, there appears to be little disagreement as to the nature of the reading matter that should be used in teaching pupils to read a modern language; but theory and practice in this seldom agree. Perhaps college entrance requirements have had undue influence.

Theoretically, there is assent to the following characteristics, all of which seem to be in harmony with adolescent interests. Modern writings rather than the classics appeal to high-school pupils. Much easy reading so graded as to give the pupils as they read a sense of progress is desirable. Short stories representing vigorous action ensure interest. If we would hold the attention of youth, human elements must dominate. Literature that deals dramatically with the life of the people who speak the language makes a natural appeal. The reading material should be varied in form and abounding in action. Because of the moral elements embodied, fables usually challenge the thought of adolescents. Any simple reading material that makes vital contact with the best in life and the things of most enduring worth is likely to receive serious consideration and to stimulate enthusiastic effort. As far as possible, the vocabulary should be practical from the standpoint of the pupils' needs; that is, consisting largely of words that are likely to be often used, and it should be devoid of abstract terms. In brief, on each level of progress the content of the reading material must be adapted to the interests and general mental

maturity of the pupils. At the high-school level of mastery, few pupils can appreciate mere beauty of form in a strange language. According to Dr. Hall, with adolescents who are learning a living tongue, content and meaning lead and words follow.

Although as indicated above, the content of the reading matter that is placed before high-school pupils is very important, we should not make the permanent mastery of the thought our chief aim; we should bear in mind that language interpretation is the principal business in hand and that the social and cultural values of the content are in the nature of a by-product and are to be realized incidentally. In the opinion of the committee of twelve, high-school pupils may be expected to read about three hundred seventy-five pages of French or two hundred fifty pages of German during the first two years. The content values of this amount of reading cannot be very great. Thus the only important criterion of selection is adaptability to the immediate interests of the pupils.

The grammatical forms and syntactical principles taught should correspond very closely with the needs of the pupils as determined by their reading. As we shall see in our consideration of method, the functions of the forms and principles furnish the natural motives for learning them. The same criterion of utility should dictate the choice of vocabulary. The material used should be such as to involve considerable repetition of words, forms, and rules of syntax.

V

The first problem encountered by the teacher of modern languages concerns pronunciation. Teachers of Latin, for apparent reasons, devote comparatively little time to this phase of their teaching. As to the correct pronunciation of any of the modern languages

there is no doubt. When pupils speak or read the words of a foreign language, they must either pronounce them as a native would or utter sounds that to them seem the correct pronunciation; that is, when we speak or read even silently, we must say or think sounds; and it appears hardly defendable to allow pupils to go through even two years of language study pronouncing words according to their individual notions, often not recognizable by one to whom the language is native, when there is an attainable standard and when a reasonable amount of properly directed effort and patience will generally secure satisfactory results.

The most approved method of teaching the pronunciation of foreign languages includes considerable drill, something that is often distasteful to the adolescent. However, the motive for undergoing this needed practice naturally appeals to the youth. There is a human element that should be interesting. As the pupil struggles with the strange sounds, he knows that he is not attempting to reach an abstract ideal, as in the physical sciences and mathematics, but that he is simply striving to produce the same *meaningful* sounds that are used by millions of other interesting human beings. The teacher with a correct pronunciation who understands the psychology of drilling and has a working knowledge of phonics need have no misgivings as to either the work or the results. As in the case of any school subject, he who does not know cannot teach.

Naturally, teaching must begin with pronunciation. This means that the first work is largely oral. The sounds of the foreign language that correspond to English sounds need cause little trouble. The foreign sounds can be learned by imitation, the teacher acting as a model. Still other sounds differ either so greatly or so subtly from English sounds that the pupils are not likely to learn them through imitation; for this

reason it is important that the teacher should have a working knowledge of phonics, not that he may instruct his pupils in the science, but that he may be able to teach them in the light of his own knowledge. For a correct reproduction of certain sounds, the vocal chords and the other organs of articulation must assume various positions that differ from those used in English speech, and the teacher can be most helpful by instructing the pupils in detail relative to the necessary adjustments of the vocal organs. If the teacher relies wholly on unguided imitation in teaching some of the foreign sounds, high-school pupils are almost sure to use the nearest English equivalents. With fourteen years of continuous practice, the sounds of the vernacular become so ingrained in the nervous and muscular machinery involved that the pupils are often unable to realize that they are not correctly imitating the sounds heard. Usually the more mature the pupils, the more help of this kind they will need, because they have less imitative skill. The consensus of expert opinion does not favor using all the elaborate machinery that in recent years has been developed to aid phonetic instruction. A few lessons at the beginning dealing with fundamentals are sufficient to initiate good habits, but the psychology of physical and mental habit formation demands a vigorous daily follow-up in this matter. Opinion differs as to the advantage of teaching a universal system of representing language sounds. Despite their convenience, such a system is not necessary, although the symbols of the International Phonetic Association are used successfully by many teachers.

Both the pronunciation and the meaning of words are best taught in their proper connection in simple sentences or word groups. In this way, the necessary auditory and articulatory imagery is built up more rapidly, since they are given a natural and meaningful

setting. Regardless of whether they are ever to speak the language, pupils must be given an opportunity to vocalize. Words and sentences that the voice has repeatedly produced are remembered longer and more accurately than those which have been learned only by inner articulation; and after self-consciousness is overcome, adolescents, because of their new "vocal consciousness," naturally enjoy any form of vocal experiment.

Although ability to read a modern language should be the immediate objective in nearly all high-school teaching, the psychology of learning dictates much oral work, including conversation. Conversation always involves at least two centers of the brain, the auditory center and the motor-speech center; and pedagogical teaching calls for action of all the usable powers of the learner. In recent years teachers of modern languages in this country have emphasized increasingly the oral phases of the work. Because of his dominating social instincts, the adolescent is readily interested through oral communication. Speaking is stimulating for both pupil and teacher. As compared with written or printed discourse, there is something very human about oral speech. Psychology has proved that the unit of language consciousness is the sentence; hence oral instruction should be based on sentences rather than isolated words. All practice in speaking foreign languages and all oral instruction should be directed toward aiding the pupils either directly or indirectly to develop ability to read and understand the languages. This means that the regular oral practice should be carefully graded and correlated with the work in reading and the instruction in grammar needed in connection with the reading. Much of the conversation naturally consists of simple discussions of the content of the reading lesson. Skillfully directed dis-

cussion is one of the principal means of ascertaining how well the reading lesson has been prepared. The efficient teacher of modern languages adroitly combines instruction, drill, and testing; he spends very little time in merely finding out how much his pupils have studied. Since language is an art, nearly all available time must be devoted to practicing the art. Teachers and psychologists agree that it is mainly by speaking a language that one develops a feeling for it and comes to have an "unconscious comprehension" of it. High-school pupils have lost the child's spontaneous capacity for acquiring speech; hence they need the stimulus and encouragement of the socialized recitation. Thus conversation is an important accessory for all phases of language learning. To be effective with adolescents, it should be as natural and spontaneous as possible.

Adolescent psychology suggests that word lists as such are naturally distasteful to high-school boys and girls. As in Latin, words needed for reading or speaking a modern language are best learned inductively. As far as possible, the meaning should be gained from their setting in a spoken sentence or in connection with the objects, actions, relations, or qualities which they represent. If the pupils keep notebooks, the new words should be entered not as isolated words, but as elements in a sentence or a complete word group. This practice is helpful in at least six ways: It fixes one of the various meanings which the words are capable of conveying, the motor activity used in writing enlists more faculties in the learning process, the pupils see how the new word looks when written, they are less likely to form the vicious habit of writing the meaning of words on the margin of the page, and they have at hand a convenient reference list and are provided with an effective means of reviewing. For the purpose of initiating correct habits, the first time a word is en-

countered the correct pronunciation should be stressed, and often it should be indicated in the notebooks.

Inasmuch as the mastery of a language depends largely upon an adequate knowledge of words and their ways, it is very important that the teacher be thoroughly pedagogical in teaching a vocabulary. Both psychologists and teachers have given much attention to this phase of teaching. Bovée lists twenty ways of teaching the meaning of new words without using the English equivalents. These constitute one aspect of the "direct method," which has many adherents both in theory and in practice. A working knowledge of the ways mentioned by Bovée[1] should form part of the teacher's equipment. They are as follows: using objects, showing pictures, asking questions as to the utility of objects, performing complete actions, making gestures, questioning the purpose of acts, using sentences involving the logical sequence of actions (I take my pen; I *write* a *letter*), using easily recognized examples (Paris is a *city*), using statements assigning the reason for going to a place, mentioning contraries, giving definitions, noting similarity to English words, using synonyms, using sentences involving cause and effect or conditions, using questions relative to the proper time and place for an action (What do you do at night?), characterizing an object (The picture is *beautiful*), naming numerical processes (Twenty-four hours make a *day*), stating a situation (When I meet a lady, I *raise* my hat), changing the grammatical relation of words as verbs to nouns, adjectives to adverbs, and placing words in fitting contexts. The users of the direct method largely dispense with English words as intermediates; in reading, they pass directly from the foreign symbol to its meaning; in speaking or writing they pass directly from the thought to

[1] Bovée Arthur A., *Teachers' Manual.* Ginn.

foreign symbols. Economy is claimed for the direct method, since only one association is needed, whereas two are necessary when using the indirect method. The arguments for and against the two methods are numerous; the best practice employs both. However, we may be sure that the learning of mere words is a dreary business at high-school age; hence the teacher's presentation must be skillful and varied.

It was suggested that the most useful words should be taught first. Palmer reminds us that there are two sorts of "useful words," those which are useful because of their meaning and those which are useful because they are needed in forming sentences. In his opinion, "twenty-five well-chosen words will form more useful sentences than many people believe; with five hundred well-chosen words an incredibly large number of valuable sentences can be formed." The accuracy of this statement has been proved by special studies. The skillful teacher and the alert pupil will make use of this carefully selected vocabulary as "a sort of center of attraction for new language-material."[1] For the purpose of making the recitation more interesting and in order to meet the adolescent demand for knowledge that functions immediately, the new vocabulary should include a list of words to be used in directing the classroom work and in making explanations relative to the daily lessons. No means must be neglected that will make the work immediately significant in the lives of the pupils; this is the psychological requirement in secondary education.

Many of the recent authorities on modern language teaching discourage the learning of "dictionary words" and urge that the memorized material be units of speech

[1] From Palmer's *The Principles of Language-Study*. Copyright in Great Britain. All rights reserved by World Book Company, Publishers, Yonkers-on-Hudson, New York.

ready for use. These working units should be either short sentences or groups of words already derived, inflected, and compounded. A large proportion of dictionary words are not immediately usable, but must be modified in some way before they will function grammatically in a sentence. This clearly involves a lack of economy; our pupils should be furnished with word-groups (ergons) to correspond with and express their thought-units. These thought-units are the natural elements of oral speech; hence our pupils should develop ability to read group-words.

What light does the psychology of adolescence throw on the teaching of such grammar as is needed to understand a modern language? As in the case of Latin, it calls for an inductive approach. Since the youth is concerned primarily with getting and expressing thought, he is naturally interested in whatever aids in thought interpretation and thought conveyance. This suggests that the essentials of grammar must be needed and the need felt by the pupils before any attempt is made to teach these essentials. This means that for adolescents grammatical rules and syntactical principles are not natural units of instruction. The logic of such a unit may be perfectly obvious and extremely interesting to an adult, and the adult whose mature mind is continually focusing on grammatical distinctions is always in danger of becoming "grammar-minded." His safeguard against this academic tendency is sympathetic contact with the adolescent intellect which naturally focuses on content. Thus the necessary principles of grammar, like the other facts of a foreign language, are to be learned when needed in speaking and reading. This living grammar appeals because its meaning and uses are immediately apparent.

Psychology suggests, too, that the necessary drill on rules be given largely through practice in speaking,

reading, and writing. An attempt by coöperative class effort to formulate a grammatical principle is a splendid and interesting exercise in thought concentration and in oral English. The result is a formal statement of how through usage people have contrived to combine words to express their thoughts and feelings; and because of the way the statement is obtained, the result is full of meaning for the pupils, hence more satisfying and more readily held in memory. At the basis of correct teaching of grammar is association, association of the right grammatical relations and forms, such as the relation between the form of the subject and verb and the form of the adjective and the noun it modifies. These associations, like other associations, are made firm and readily usable by interested repetition.

Professor Bagster-Collins of Columbia, in comparing the possibilities of teaching high-school pupils to speak a modern language with the advisability of making reading the chief aim, sums up the experience and opinions of many teachers. "The school is not a favorable place for the acquisition of a language technique commensurate with the energy that would have to be expended and for which there is not sufficient time. The field of reading, on the other hand, is not only broad and cultural, but the kind of work required to teach pupils to read successfully is quite in keeping with school conditions." Since the report of the committee of twelve in 1899, the "reading method" in some form has grown in favor with modern language teachers; consequently the aims and the methods used in teaching pupils to read a foreign language have become very important. A definite reading technique is needed.

In order to ensure the feeling on the part of high-school pupils that they are accomplishing something more

than merely learning words, sounds, forms, and meanings preparatory to doing the real thing, reading should begin early in the course (many say at the beginning) and continue in increasing amounts. The aim from the first is to get the thought contained in the foreign sentences (never mere transverbalizing); *literal* translating is considered vicious procedure. The second step for the beginner is to give the thought in clear, idiomatic English. There comes a time when the aim should be to get the content of a foreign sentence direct without thinking the corresponding English sentence. However, the power to do this, although an ultimate aim, does not come so soon as many enthusiasts seem to believe. Palmer, who is a high authority, maintains that the right kind of translation and the use of the mother tongue "are perfectly harmless and in many cases positively beneficial."[1] To get the thought of a foreign sentence, the meaning of the word groups must be understood. During much of the past teaching of foreign languages, it has been thought necessary for pupils faithfully to thumb their dictionaries in order to get the meaning of words. The much turning of pages which this necessitates, like other mechanical performances, naturally becomes very irksome; and when the word is found, the pupil often is confronted with such a perplexing array of meanings that his troubles are just beginning. Unless care is taken to avoid it, efforts at reading will degenerate into some sort of word-for-word translation with results not always classifiable as English. This surely suggests that pupils need help; and in fairness to our high-school pupils, much class time must be devoted to giving this help. If the necessary help is not forthcoming, our pupils will either form bad reading habits or seek more congenial tasks. Many of the words and

[1] *Op. cit.*

word groups should be taught orally, using the direct methods already noted; and the pupils must be encouraged to obtain the meaning of words and idioms from their setting, for this is the way that words get their true meanings. This kind of instruction requires much time. The real test of success in teaching is the pupils' *growing* power to understand and read the foreign language, and not the amount they have covered in a given time.

There is always the question of extensive and intensive reading. Each has its characteristic advantages and disadvantages. As in the study of English literature, neither can be neglected. In general, the adolescent prefers to read extensively, to get the gist of the story or thought, to see the thing in the large. This is because he is primarily interested in content and wishes to seize upon it quickly. Alert pupils who practice this kind of reading become experts in getting the meaning of words and word groups from the context; and they gain valuable training in making rapid inferences. The greater amount that pupils are able to read in this way helps to give them a feeling for the language. Although any reading is an artificial procedure, this method is more natural than the intensive reading of a foreign language. However, continuous extensive reading has its dangers, for which intensive reading is the natural corrective. Rapid reading in which inference, and sometimes guessing, takes the place of accurate and detailed knowledge tends to habits of looseness and inaccuracy—that is, habits and attitudes that are unscholarly. At times even adolescents should be held to exact analysis and accuracy in detail; the feeling of security that comes from a limited use of intensive study serves as a natural motive and will reconcile high-school pupils to this kind of reading. The classroom, presided over by an animated

and enthusiastic teacher, with its clash of ideas and its natural and cultivated rivalry, is the proper place to do intensive reading and train in close thinking. Much of the home reading may profitably be extensive; the same material may be fruitful when dealt with intensively in the classroom. However, intensity of treatment must never degenerate into mere study of rules of grammar, syntactical analysis, scientific phonetics, and the like. Unless these clearly contribute to the pupils' power to get and give thought, they are distracting and obstructive to real progress.

V

If we are to make the learning of a foreign language appeal to high-school pupils, we must be guided by the principles that have been found applicable to the teaching of any art. This means, of course, that our primary aim is to train our pupils to *do* rather than to *know;* stated otherwise, we are to teach them only such knowledge as is essential to the thing we wish them to do, which, in this case, is to read (not translate) a foreign language. The learning of any art is a habit-forming process; and proficiency in a modern language involves not only acquiring new combinations but the forming of *new* habits. This means that, during the first stages of every phase of the work, the teacher must be extremely alert as to the correct initiation of new processes, because bad language habits are difficult to uproot. However, this watchfulness of all beginnings in language habits must not ignore the adolescent's natural aversion to anything that seems like trifling fussiness.

Some of the new habits needed are observation of new forms and sounds, articulation, stressing and intoning, ways of compounding, ways of expressing—in other words, ear training and mouth training. There

must be a sharpening of the power to receive through the eye and ear, but especially through the ear. As Palmer reminds us, this initial training "is not confined to isolated sounds and simple combinations of sounds; it also includes the exercise of our capacities for perceiving or retaining long strings of syllables such as sentences." [1] There is involved in all this the development of muscles that have not been used in speaking English; this calls for a brief course in "mouth-gymnastics."

This initial training in new habits which focuses on sounds and forms as such seems to be opposed to the teachings of adolescent psychology which require concentration upon subject matter. This apparent opposition of principles of which the teacher must be aware demands tact and skill; the pupils must always be made to understand that all their efforts eventuate in thought getting and thought expressing. It is the teacher's part to keep his pupils' attention fixed on the circumstances rather than on the words which grow out of the circumstances. Skillful oral use of a foreign language in the classroom will help to initiate and foster this attitude on the part of the learners. The teacher talks to his pupils about the parts of the classroom and its contents while he moves around and accompanies his words with fitting gestures; he requests his pupils to do certain things; he asks questions, demanding attention to conditions and circumstances that can be answered briefly. These suggest some of the initial phases of the work.

The formation of the necessary habits implies much repetition, and repetition generally involves monotony. Mechanical repetition is deadening. But there is no monotony necessarily involved in having many opportunities to hear and see the same words in varying

[1] *Op. cit.*

phrases and sentences and having many occasions to speak and write them. If the content is new and interesting, pupils naturally enjoy meeting with and using old forms; they feel that the implements they have acquired are really very useful. Psychology suggests that, in learning an art, it is more interesting and profitable to use the time in attractive forms of repetition than in carefully explaining the reasons for the forms used. As Palmer insists, "explanations are not indispensable concomitants of memorizing." The teacher must resist the temptation to replace psychological methods by analysis and synthesis and other forms of explanation.

Accuracy is an important ideal in the mastery of any art. In language teaching there is a fundamental principle which guides all careful instructors. The principle is based on one of the laws of habit formation which the psychologists have so often formulated. It may be stated as follows: So manage the work that the pupils have no opportunity for mistakes until they have reached a stage that is conducive to accuracy. As used in connection with learning a foreign language, "accuracy" is a relative term; there is no absolute accuracy. Experienced teachers of modern languages have learned that it is necessary to guard against inaccuracy as to sounds and stress, spelling, combining words (compounding and sentence building), inflection, and meanings that vary with context. As far as possible, skillful teachers conduct the efforts of pupils along lines that are safeguarded as to the forms of inaccuracy just noted; for example, they give appropriate instruction in the production of foreign sounds before the pupils attempt to read, and they teach words in their proper combinations rather than as isolated terms. The method of trial and error is not suited to learning language.

The principle of gradation is important. This prin-

ciple does not, as in some subjects, demand that we pass from the easy to the difficult. It does imply that we begin with the most useful and move on to the less useful, from the most significant to the least significant, from the most fundamental to the least fundamental. This process is in the interest of accuracy in learning, each working unit mastered serving as a natural preparation for the next. In applying the principle of gradation, the most usable words, moods and tenses, and associations are taught first; but there is not necessarily implied the teaching of regular before irregular forms, children's language before adult language, or pidgin speech before correct speech.

Any teacher who is sensitive to the workings of the youthful mind naturally applies the principle of concreteness, which has been implied at many points in the foregoing discussions. In following this principle, the teacher often replaces rules by examples, and he precedes rules by a liberal number of examples; he teaches nouns that are represented by objects within sight or reach; he prefers verbs that express acts that can be readily performed; he begins with prepositions expressing relations easily indicated. Palmer sums up this matter by urging the teacher to "observe the principle of concreteness by using examples, many examples, cumulative examples, real examples, and examples embodying the personal interest." [1]

The next principle, essential to all teaching but imperative in dealing with adolescents, has been implied in this and all preceding chapters. "The art of teaching is only the art of interesting, of arousing curiosity, and curiosity is active only in happy minds." This is the dictum of Anatole France, who always interested his readers; he says nothing new, but he emphasizes a pedagogical principle often neglected when he states

[1] *Op. cit.*

the psychological condition of curiosity. The principle of interest is difficult to observe in teaching any foreign language. Forming new habits and memorizing strange sounding and appearing sentences and word combinations are not inherently interesting occupations. As we have seen, the youth wants to use his judgment and reason, to give flight to his imagination, to encounter new ideas, and to do all this with suitable emotional accompaniments. The repetition needed in all language study gives little scope for these mental powers whose exercise is so satisfying to high-school pupils. Surely the method of presentation, the manner of the teacher, and the atmosphere of the classroom are especially important in teaching language. These must stimulate interest in repetition and drill; and even the method and the manner may arouse curiosity. But the needed qualities are not attained by any rigid rules of teaching. What follows is intended to be suggestive.

Bovée urges that a modern language "should be taught with a smile and often times in a spirit of half jest." [1] Like Anatole France, he believes that "happy minds" furnish the indispensable condition for interest. Vivacity inspires and makes any task a pleasure.

Vivacity of manner suggests variety of method. This is needed continually in drill. Skillful teachers do not drill their pupils forty-five minutes at a time; and they blend eye, ear, and mouth drills. Tedium seldom results from variety. Monotony due to any cause can be relieved by a judicious use of the living language; and through this use endless variety can be introduced. Perhaps one of the most pedagogical ways of getting variety is the alternating of principles and their application, explanation always following the expression of thought.

[1] *Op. cit.*

Difficulties are not unfavorable to interest, for the youth often rejoices in overcoming the difficulties that are natural to learning a foreign language. But perplexity is always opposed to interest. Careful grading of all phases of the work is the natural safeguard against perplexity; and when perplexity is manifest, a clear explanation of the fundamental involved is the natural remedy and satisfies adolescent curiosity, which is an important form of motivation.

Doubtless the most natural and sure source of interest is a sense of progress on the part of the pupils. To secure and maintain this feeling of progress a suitable gradient is indispensable; when real difficulties arise, it will usually be found that the gradient has been too steep, and reteaching is the remedy. Reteaching does not mean repeating the same material; it usually means a return to easier reading matter or easier oral and written exercises. A sense of progress comes from contact with new language experiences and the understanding of new facts. The mind, like the body, grows by what it feeds upon; and there must be a consciousness of new mental food suited to the immediate needs and interests of the learner. Experience-getting opportunities ensure a feeling of achievement and the needed sense of progress.

It is unfortunate to write concerning the teaching of modern languages before the results of the modern language studies now in progress are available. However, it is pretty well agreed that there should be no substantial difference as to aims between the ancient and the modern languages; and all are agreed that the same psychological and pedagogical principles are involved. For apparent reasons, the teacher of a modern language may profitably give more attention to pronunciation and use more class time in conversation. But on the whole, the classroom technique is

the same. Success in teaching either an ancient or a modern language grows out of a clear understanding of definite and worthy aims and a sympathetic knowledge of adolescent interests and intellectual needs. Real and continued success cannot rest on ingenious devices and "little hypodermic jabs of method"; these do not create energy, nor are they a permanent source of inspiration. As far as possible, in the teaching of any language, the work should be kept on the play level; the *comédie de la classe* must provide for individual differences; and all well-directed spontaneity must be recognized and encouraged. All this applies to the teaching of both ancient and modern languages.

BIBLIOGRAPHY

ADAMS, JOHN, *The Herbartian Psychology Applied to Education.* Heath, 1897.

ALLEN, J. W., *The Place of History in Education.* Blackwood, London, 1909.

AMERICAN CLASSICAL LEAGUE, *The Classical Investigation.* Princeton Press, 1924.

AMERICAN HISTORICAL ASSOCIATION, COMMITTEE OF FIVE, *Study of History in Secondary Schools.* Macmillan, 1911.

AMERICAN HISTORICAL ASSOCIATION, COMMITTEE OF SEVEN, *Study of History in the Schools.* Macmillan, 1899.

ARMSTRONG, H. E., *The Teaching of the Scientific Method.* Macmillan, 1910.

BAGLEY, WILLIAM C., *Educative Process.* Macmillan, 1907.

——, *Educational Values.* Macmillan, 1911.

BAHLSEN, L., *New Method of Teaching Modern Languages.* Columbia University Press, 1903.

BALDWIN, B. T., *Mental Growth Curves of Normal and Superior Children.* University of Iowa, 1922.

BARBER, HARRY C., *Teaching of Junior High-School Mathematics.* Houghton Mifflin, 1924.

BARNES, M. S., *Studies in History Method.* Heath, 1896.

BATES, ARLO, *Talks on the Study of Literature.* Houghton Mifflin, 1901.

BENNETT, C., and BRISTOL, G. P., *The Teaching of Latin and Greek in Secondary Schools.* Longmans, Green, 1901.

BETTS, G. H., *The Recitation.* Hawkeye Publishing Company, 1910.

BOBBITT, FRANKLIN, *How to Make a Curriculum.* Houghton Mifflin, 1924.

BOURNE, H. E., *The Teaching of History and Civics.* Longmans, Green, 1902.

BRANFORD, BENSHARA, *Mathematical Education.* Clarendon Press, 1921.

BREUL, K. H., *The Teaching of Modern Foreign Languages.* Putnam, 1907.

BROWN, ROLLO W., *How the French Boy Learns to Write.* Harvard Press, 1915.

CAMPAGNAC, E. T., *The Teaching of Composition.* Houghton Mifflin, 1912.

CHAMBERLAIN, H. S., *The Foundation of the Nineteenth Century.* Lane, 1912.

CHUBB, PERCIVAL, *The Teaching of English.* Macmillan, 1902.

COLGROVE, C. P., *Teacher and the School.* Scribner, 1910.

COLUMBIA ASSOCIATES IN PHILOSOPHY, *An Introduction to Reflective Thinking.* Houghton Mifflin, 1923.

COLVIN, STEPHEN S., *Introduction to High-School Teaching.* Macmillan, 1922.

CORSON, HIRAM, *The Aim of Literary Study.* Macmillan, 1895.

DAVIS, C. O., *Junior High-School Education.* World Book Company, 1924.

DEWEY, JOHN, *Human Nature and Conduct.* Henry Holt, 1922.

——, *Democracy and Education.* Macmillan, 1916.

——, *How We Think.* Heath, 1910.

DOUGLASS, H. R., *Modern Methods in High-School Teaching.* Houghton Mifflin, 1926.

DUNN, A. W., *Social Studies in Secondary Education.* United States Bureau of Education Bulletin, No. 28, 1916.

EVANS, GEORGE W., *The Teaching of High-School Mathematics.* Houghton Mifflin, 1911.

FOSTER, H. F., *Principles of Teaching in Secondary Schools.* Scribner, 1921.

FRANZEN, G. F., *A Comparison between General and Special Method Courses.* University of Iowa, 1922.

GAME, J. B., *Teaching of High-School Latin.* University of Chicago Press, 1916.

GANONG, WILLIAM F., *The Teaching Botanist.* Macmillan, 1910.

HALL, G. STANLEY, *Adolescence,* Vol. II. Appleton, 1904.

——, *Educational Problems.* Appleton, 1911.

HANDSCHEN, *The Teaching of Modern Languages in the United States.* Bureau of Education Bulletin, No. 3, 1913.

HARTWELL, E. C., *The Teaching of History.* Houghton Mifflin, 1913.

HATCH, R. W., "The Teaching of History by the Project Method." *Teachers' College Record,* Vol. XXI, 452–470.

HILL, MABEL, *The Teaching of Civics.* Houghton Mifflin, 1914.

HINES, H. L. *Measuring Intelligence.* Houghton Mifflin, 1922.

HOLLEY, C. E., *The Teacher's Technique.* Century, 1922.

INGLIS, ALEXANDER, *Principles of Secondary Education.* Houghton Mifflin, 1918.

JAMES, WILLIAM, *Psychology.* Henry Holt, 1896.

——, *Talks to Teachers on Psychology.* Henry Holt, 1899.

JOHNSON, HENRY, *The Teaching of History in Elementary and Secondary Schools.* Macmillan, 1915.

JOHNSTON, C. H., *High-School Education.* Scribner, 1912.

JUDD, CHARLES H., *Psychology of High-School Subjects.* Ginn, 1915.

KEATINGE, M. W., *Studies in the Teaching of History.* A. and C. Black, London, 1910.

KIRKPATRICK, EDWIN A., *The Individual in the Making.* Houghton Mifflin, 1911.

KLAPPER, P., *The Teaching of English.* Appleton, 1915.

KNOWLTON, D. C., *History and the Other Social Studies in the Junior High School.* Scribner, 1926.

LANGOIS, C. V., and SEIGNOSBOS, C., *Introduction to the Study of History.* Duckworth, 1898.

LLOYD, F. E., and BIGLOW, M. A., *The Teaching of Biology in Secondary Schools.* Longmans, Green, 1914.

MCMURRY, CHARLES A., and F. M., *The Method of the Recitation.* Macmillan, 1903.

MACE, W. H., *Methods in History.* Ginn, 1897.

MACH, E., *The Science of Mechanics.* Open Court Publishing Company, 1902.

MANN, C. RIBORG, *The Teaching of Physics.* Macmillan, 1912.

MATHEMATICAL ASSOCIATION OF AMERICA, NATIONAL COMMITTEE ON MATHEMATICS REQUIREMENTS, *The Reorganization of Mathematics in Secondary Education,* 1923.

MILLIS, W. A., and H. S., *The Teaching of High-School Subjects.* Century, 1925.

MONROE, PAUL, *Principles of Secondary Education.* Macmillan, 1914.

MORRISON, HENRY C., *The Practice of Teaching in the Secondary School.* University of Chicago Press, 1926.

MUDGE, E. L., *Varieties of Adolescent Experience.* Century, 1926.

NATIONAL COUNCIL OF THE TEACHERS OF MATHEMATICS, *First Yearbook,* 1926.

NEAL, ROBERT WILSON, *Thought Building in Composition.* Macmillan, 1912.

NEW YORK STATE, *Junior High School Syllabus in Latin.*

NUNN, T. P., *The Teaching of Algebra.* Longmans, Green, 1914.

O'SHEA, M. V., *Linguistic Development in Education.* Macmillan, 1907.

PALMER, GEORGE H., *Self-Cultivation in English.* Crowell, 1897.

PALMER, H. E., *The Principles of Language Study.* World Book Company, 1921.

PARKER, SAMUEL CHESTER, *Methods of Teaching in High Schools.* Ginn, 1915.

PEARSON, K., *The Grammar of Science.* Black, London, 1900.

PECHSTEIN, LOUIS A., and MCGREGOR, A. LAURA, *Psychology of the Junior High School Pupil.* Houghton Mifflin, 1924.

PENNSYLVANIA, *Syllabus in Latin for High School,* 1913.

POINCARÉ, HENRI, *Science and Hypotheses.* Science Press, 1921.

PRINGLE, RALPH W., *Adolescence and High-School Problems.* Heath, 1922.

REAVIS, WILLIAM C., *Pupil Adjustment.* Heath, 1926.

RICHMOND, WINIFRED, *The Adolescent Girl.* Macmillan, 1925.

RUGG, HAROLD O., *Experimental Determination of Mental Discipline in School Studies.* Warwick and York, 1916.

RUSK, ROGER D., *How to Teach Physics.* Lippincott.

SCHULTZE, ARTHUR, *The Teaching of Mathematics in Secondary Schools.* Macmillan, 1912.

SLAUGHTER, JOHN W., *The Adolescent.* George Allen and Unwin, London, 1917.

SLAUGHTER, M. S., *The High-School Course in Latin.* University of Wisconsin, 1908.

SMITH, A., and HALL, E. H., *The Teaching of Chemistry and Physics in Secondary Schools,* 1902.

SMITH, DAVID EUGENE, *The Teaching of Geometry.* Ginn, 1911.

SNEDDEN, DAVID S., *Problems in Secondary Education.* Houghton Mifflin, 1917.

STEVENS, R., *The Question as an Index of Efficiency in Instruction.* Teachers' College, Columbia University, 1912.

STRAYER, GEORGE D., and NORSWORTHY, ROBERT M., *How to Teach.* Macmillan, 1917.

TERMAN, LEWIS M., *The Intelligence of School Children.* Houghton Mifflin, 1919.

——, *The Measurement of Intelligence.* Houghton Mifflin, 1916.

THOMAS, CHARLES S., *The Teaching of English in the Secondary Schools.* Houghton Mifflin, 1917.

THORNDIKE, EDWARD L., *Educational Psychology.* Columbia University, 1914.

——, *Individuality.* Houghton Mifflin, 1911.

——, *The Principles of Teaching.* A. G. Seiler, 1906.

——, *The Psychology of Algebra.* Macmillan, 1923.

TRACY, FREDERICK, *The Psychology of Adolescence.* Macmillan, 1920.

TRYON, ROLLA M., *Teaching of History in Junior and Senior High Schools.* Ginn, 1921.

TURNER, EDWIN A., *Essentials of Good Teaching.* Heath, 1920.

TWISS, GEORGE R., *Principles of Science Teaching.* Macmillan, 1917.
WAPLES, DOUGLAS, *Procedures in High-School Teaching.* Macmillan, 1924.
WATSON, J. B., *Behaviorism.* Peoples' Institute Publishing Company, 1925.
WAYLAND, JOHN W., *How to Teach American History.* Macmillan, 1914.
WOODHULL, JOHN FRANCIS, *The Teaching of Science.* Macmillan, 1918.
YOUNG, J. W. A., *The Teaching of Mathematics in Elementary and Secondary Schools.* Longmans, Green, 1924.

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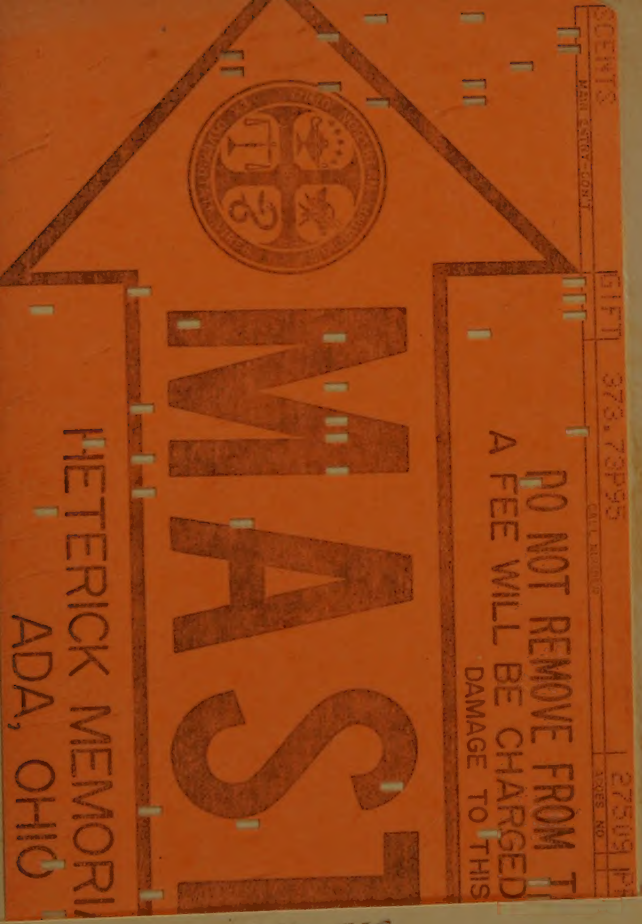

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